



Montana Fish, Wildlife & Parks

Fisheries Division Report
State Project Number: 3712
Project Title: Prairie Streams Survey 2007 – Region 7

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January 2008

TABLE OF CONTENTS

Introduction	1
Methods	1
Site Location and Sampling	1
Fish Survey	3
Amphibian and Reptile Survey	3
Water Quality Survey and Habitat Survey	3
Results	4
Site Surveys	4
Fish Surveys	4
Amphibian an Reptile Surveys	4
Water Quality Surveys	5
Major Observations by HUC	5
10040104 – Fort Peck Reservoir	5
10040106 – Middle Musselshell	5
10040205 – Lower Musselshell	5
10080015 – Lower Bighorn	6
10090101 – Upper Tongue	6
10090102 – Lower Tongue	6
10090207 – Middle Powder	6
10090208 – Little Powder	6
10090209 – Lower Powder	6
10090210 – Mizpah	7
10100001 – Lower Yellowstone-Sunday	7
10100002 – Big Porcupine	7
10100003 – Rosebud	7
10100004 – Lower Yellowstone	8
10100005 – O’Fallon	8
10110201 – Upper Little Missouri	8
10110202 – Boxelder	8
10110204 – Beaver	8
Acknowledgements	44
Literature Cited	44

LIST OF TABLES

Table 1:	Fish species captured during Region 7 prairie stream surveys, May – September 2007	9
Table 2:	Statistics of fish captured by HUC and site during Region 7 prairie stream surveys, May – September 2007	10
Table 3:	Reptiles and amphibians observed while conducting Region 7 prairie stream surveys, May – September 2007	17
Table 4:	Reptiles and amphibians observed by HUC and survey site during prairie stream surveys, May – September 2007.....	18
Table 5:	Water quality and length statistics of fish species captured during Region 7 prairie stream surveys, May – September 2007	23
Table 6:	Water type and quality measurement data collected during Region 7 prairie stream surveys, May – September 2007	25
Table 7:	Stream morphology and substrate composition of Region 7 prairie streams sampled, May – September 2007	32

LIST OF FIGURES

Figure 1:	Region 7 Prairie Stream Survey Sites, May – September 2007	3
Figure 2:	Percent water types observed in Region 7 prairie stream surveys, May – September 2007	16
Figure 3:	Water types observed by HUC during Region 7 prairie stream surveys, May – September 2007	22
Figure 4:	Number of fish species observed at Region 7 prairie stream sites with date sampled and total stream length (miles), May – September 2007	36
Figure 5:	Number of fish species observed at the Hanging Woman Creek CBM repeat site by year and season, 2003-2007..	37
Figure 6:	Number of fish species observed at the Youngs Creek CBM repeat site by year and season, 2003-2007	38
Figure 7:	Number of fish species observed at the Pumpkin Creek CBM repeat site by year and season, 2003-2007	39
Figure 8:	Number of fish species observed at the Little Powder River CBM repeat site by year and season, 2003-2007 ...	40
Figure 9:	Number of fish species observed at the Spring Creek CBM repeat site by year and season, 2003-2007	41
Figure 10:	Number of fish species observed at the Sarpy Creek CBM repeat site by year and season, 2003-2007	42
Figure 11:	Number of fish species observed at the three Rosebud Creek CBM repeat sites by year and season, 2003-2007...	43

LIST OF APPENDICES

Appendix A: Name and location by HUC of Region 7 prairie stream survey sites sampled, May – September 2007	Appendices page 1
Appendix B: Procedures used to determine Eastern Montana prairie stream survey sites	Appendices page 7
Appendix C: Fish and habitat sampling protocol and gear list for prairie stream surveys in Region 7, May – September 2007	Appendices page 8
Appendix D: Fish data entry form used during Region 7 prairie stream surveys, 2007	Appendices page 12
Appendix E: Habitat data entry form used during Region 7 prairie stream surveys, 2007	Appendices page 13

INTRODUCTION

A survey of 111 sites comprised of 97 Region 7 streams (Figure 1 and Appendix A) was conducted between May 8 and September 6, 2007. This survey was performed as part of a comprehensive Montana prairie stream inventory to document the occurrence and distribution of fish, amphibian, and reptile species in the prairie streams of Montana Fish Wildlife and Parks (MFWP) administrative Regions 7. This was the first time that the majority of these streams had been sampled for fish and efforts were made to survey new sites within the region as well as focusing on Powder River Coalbed Methane (CBM) Basin streams, which are currently or may be subject to CBM discharge water. Additional efforts were made to sample sites that were previously sampled by Elser (1980). Expected benefits of this project include filling in data gaps on distribution and occurrence of native prairie fish as well as amphibians and reptiles; determining where intact assemblages of native fish species occur; increasing knowledge about the distribution of sensitive species; gathering information on the spatial and temporal use of prairie streams by native fish species; and, gathering baseline data to respond to resource pressures such as land management practices, coal bed methane extraction, and bait fish seining (McDonald, 2003).

METHODS

Site Location and Sampling –

Steve Carson, recent Programmer/Analyst for Montana Fish Wildlife and Parks (MFWP), performed random survey site generation. Random sites were selected based on stream length, 4th Code Hydrologic Unit (HUC), and lack of previous sampling. A latitude and longitude coordinate in decimal degree units was associated with each random survey site. Appendix B outlines complete random site generation procedures. A primary and alternate site was generated for each survey stream. Sites were prioritized based upon total stream length with emphasis on sampling streams greater than 10 miles in length. If access was denied at the primary site an attempt was made at the alternate location. If neither site could be accessed, then the nearest public land or area where landowner permission was granted was sampled. If a site was dry, an attempt was made to locate a wetted portion of stream within a one-mile radius of both the primary and alternate sites as described in Dr. Bob Bramblett's protocol (Appendix C). MFWP fishery staff selected additional survey sites based on prior sampling, interest in updated results, and management needs. Individual survey sites were located using a Garmin eTrex VISTA global positioning system (GPS) unit in conjunction with Bureau of Land Management (BLM) maps, and topographic maps (DeLorme 2001). Once accessible sites were located, layouts of a 300-meter sample reach were performed using methods described by Bramblett (Appendix C), in addition to sampling the most wetted portion. Sites were classified as dry, interrupted standing pools, continuous standing water, or water flowing. GPS decimal degree coordinates and photographs were taken at each sample site.

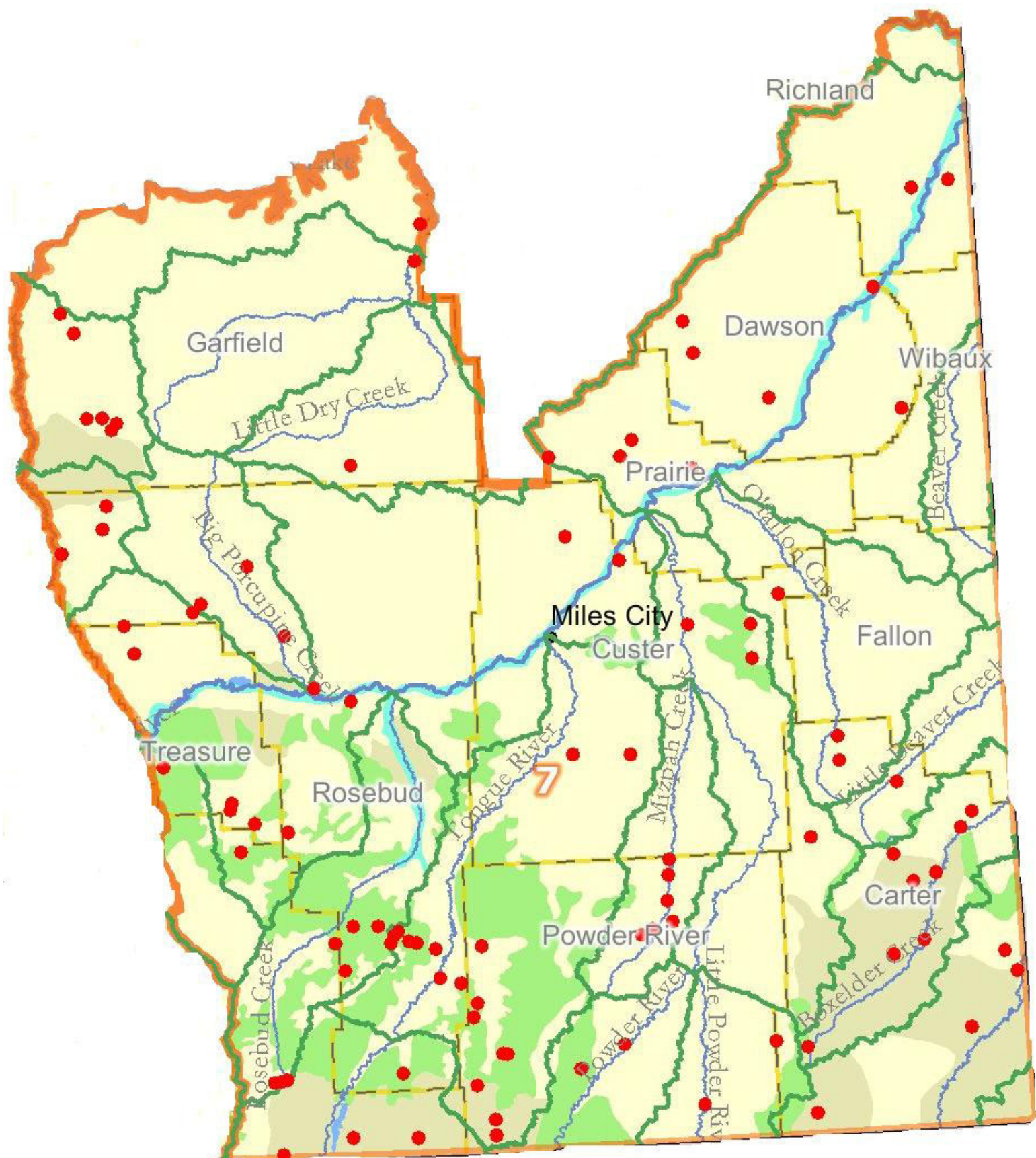


Figure 1. Region 7 Prairie Stream Survey Sites, May – September 2007

Fish Survey –

Sites were sampled using seines, dip nets, or a backpack electrofishing unit. Seines used included: 6' x 20', 4' x 15', 6' x 30' with a 6' x 6' x 6' bag, and 4' x 12' with a 4' x 4' x 4' bag. Mesh size and type on all seines was ¼" heavy delta, except for the 4' x 12' bag seine which was 3/16" mesh. Seine size and use of block nets was determined by stream morphology. A two-person crew executed seine hauls by applying Bramblett's protocols (Appendix C). Captured fish were sorted into buckets of like species. Bramblett's protocol (Appendix C) was used in processing captured fish. Fish were anesthetized using tricaine methyl sulfonate (MS-222) and identified. Help in field identification of fish was accomplished using Holton and Johnson (2003) and a looking glass. If numbers allowed, total lengths in millimeters (mm) were recorded on at least 20 of each species, and typically a minimum of five individuals were preserved in a 10% Formalin solution for proper identification confirmation at a later date. If possible, minimums of 20 specimens were vouchered from the genus *Hybognathus*. Fish data was recorded on "Rite in the Rain" data sheets (Appendix D). Fish that were not measured or preserved were counted and released. Identification validation of vouchered specimens was done at a later date, and if errors occurred, number totals were adjusted by extrapolation on a percentage basis.

Amphibian and Reptile Survey –

All amphibian and reptile sightings at survey sites or while in transit were recorded. Reichel and Flath (1995) and Werner et al. (2004) were used for species identification. Date, species, number of adults or larvae observed, location description including county, and GPS coordinates were documented.

Water Quality Survey and Habitat Survey –

Water turbidity data was taken using a LaMotte 2020 Turbidimeter and reported as nephelometric turbidity units (NTU). A YSI Model 85 Meter was used to measure water temperature (° C), conductivity (µS), salinity (ppt), and dissolved oxygen (% and mg/l). Conductivity measurements were compensated to 25° C. Stream pH data was collected using a Hannah pHep meter.

Habitat surveys at sites followed the protocol set forth by Bramblett (Appendix C). Channel width (m), depth of water (cm), and substrate composition were recorded on a "Rite in the Rain" data sheet (Appendix E). Substrate types were classified by size and type, including bedrock, boulder, cobble, coarse gravel, fine gravel, sand, fines, hardpan, woody debris, and other. Transect data included 11 stream widths recorded at 30m intervals; with five transect depth and substrate type profile measurements at each, totaling 55 transect depth and substrate type data points. Depth and substrate type data was taken at 10 intervals in the thalweg between each transect, totaling 100 thalweg depth and substrate type data points. The percent of wetted reach sampled was determined by counting all depths >0 and dividing that by the total number of depths taken (155) and rounding to the nearest 0.01 percent. The percent of substrate composition was calculated by counting the number of times each substrate type was

observed divided by the total number of all substrate types observed and rounded to the nearest 0.1 percent. Note, this data could be biased towards larger substrate type since 55 of the substrate type readings occurred in stream transects, while 100 substrate type readings occurred in the thalweg where larger substrates likely tend to settle due to faster water velocities.

RESULTS

Site Surveys –

One hundred and eleven sites comprised of 97 Region 7 streams were sampled. Seventy-six sites were randomly selected, 22 sites on eight streams were coal bed methane (CBM) repeat sites, and 13 sites were selected to compare data with that found by Elser (1980) and prior MFWP prairie stream sampling. Seventy-six sites were located on private lands; twenty-five were on public lands (12-Montana state, 6-United States Department of Agriculture National Forest, 5-Bureau of Land Management, 2-United States Fish and Wildlife Service), and ten sites were located within the external boundary of the Northern Cheyenne Indian Reservation. Sixty-five (59%) of the sites had water present and 46 (41%) of the sites were dry (Figure 2). Of the wetted sites, 38 (58%) had flowing water, 24 (37%) contained interrupted standing pools of water, and three (5%) had continuous standing water (Figure 2).

Fish Surveys –

A total of 16,853 fish were collected from 45 sites, consisting of 29 species (18 native, 11 introduced) and nine families (Table 1). Fathead minnows (*Pimephales promelas*) were the most abundant ($n = 8,611$ - 51%) of fish captured and had the highest distribution (42 sites – 93%) as seen in Table 1. Correspondingly, fathead minnows held the highest distribution in the 2003 through 2006 MFWP Region 7 prairie stream surveys (Drieling 2006). Green sunfish (*Lepomis cyanellus*) were both the most abundant ($n = 1,942$ – 12%) and highly distributed (19 sites – 42%) of non-native species observed (Table 1). Cottonwood Creek, a tributary in the Lower Yellowstone-Sunday Creek HUC had the greatest fish species diversity ($n = 16$) of all sites observed (Table 2, Figure 4). Of possible significance, a young-of-the-year bigmouth buffalo (*Ictiobus cyprinellus*) was captured at Pumpkin Creek (tributary to the Lower Tongue River) during an August survey. Bigmouth buffalo previously had not been observed in Pumpkin Creek and extreme 2007 spring flows may have triggered spawning in this reach (river mile 36.2).

Amphibian and Reptile Surveys –

Fourteen species of reptiles and amphibians comprised of nine families were observed while at or in transit to survey sites (Table 3). Northern leopard frogs (*Rana pipiens*) had the highest distribution (34 sites) and abundance ($n = 688$) of amphibians observed. Plains garter snakes (*Thamnophis radix*) had the highest distribution (12 sites) and

abundance ($n = 17$) of reptiles observed (Table 3). Herpetofauna observed at prairie stream survey sites is presented in Table 4.

Water Quality and Habitat Surveys –

Analysis of water quality ranges in which fish were observed showed a temperature range of 10.3-31.7°C, a pH range of 7.37-10.6, a specific conductivity range of 275.4-10,780µS, a turbidity range of 3.4-1,000 NTU, a dissolved oxygen range of 1.85-13.55mg/l, and a salinity range of 0.1-6.1 ppt (Table 5). Water quality measurements taken at survey sites are summarized in Table 6 and stream site morphology and substrate composition can be observed in Table 7.

Major Observations by HUC

10040104 – Fort Peck Reservoir

Two sites were sampled that included Big Dry Creek and Snap Creek. Both sites had flowing water (Figure 3, Table 6). Big Dry Creek had 10 species of fish (Table 2, Figure 4). Snap Creek was fishless, though boreal chorus frogs (*Pseudacris maculata*) and tiger salamanders (*Ambystoma tigrinum*) were observed while performing the stream survey (Table 4).

10040202 – Little Dry

Only one site was sampled in this HUC. Lone Tree Creek contained interrupted standing pools of water and four species of fish (Table 2). In addition, four species of herpetofauna were observed (Table 4). Springs flow up through the streambed at this site and a brief conversation with the landowner indicated that this particular survey site on Lone Tree Creek is perennial and historically watered over 1,000 sheep in the early 1900's.

10040402 – Middle Musselshell

Three sites were sampled within this HUC, including Antelope Creek, Big Breed Creek, and Orchard Coulee. Four species of fish were observed at Big Breed Creek (Table 2). Two of the species present included black crappie (*Pomoxis nigromaculatus*) and yellow perch (*Perca flavescens*). Presence of these two species is likely a result of being swept out of private ponds located upstream of the survey site. Two species of amphibians were also observed at Big Breed Creek (Table 4). Orchard Coulee yielded five species of fish (Table 2, Figure 4) and two plains garter snakes.

10040205 – Lower Musselshell

Six sites were sampled, including: Bair Coulee, Dead Horse Creek, Hensleigh Coulee, Seventynine Coulee, Skeleton Creek, and Tuccori Coulee. Skeleton Creek was the only

stream sampled within this HUC that had water present and resulted in the observation of 89 tiger salamander larvae (Table 5).

10080015 – Lower Bighorn

Only one site, Thunder Creek, was sampled. It contained interrupted standing pools of water (Table 6) and no fish or herpetofauna were observed.

10090101 – Upper Tongue

Four sites were surveyed within the Upper Tongue River Drainage, including: Deer Creek, Hanging Woman Creek, Waddle Creek, and Youngs Creek. Each of these streams has had prior sampling efforts and is currently being used as CBM stream survey site references where yearly and seasonal sampling has occurred at most sites since 2003. Data from these sites will be summarized later in this report.

10090102 – Lower Tongue

Nineteen sites were sampled on 16 streams. These sites included Ash Creek, Bales Creek, Billup Creek, Brian Creek, Crazy Head Fork, Dry Creek, East Fork Otter Creek, King Creek, Little Bear Creek, two sites on Logging Creek, North Fork Taylor Creek, Paget Creek, Pumpkin Creek, Taylor Creek, White Horse Spring, and two sites on Wooden Thigh Creek. Crazy Head Fork, Ash Creek, Logging Creek, North Fork Taylor Creek, Pumpkin Creek, Taylor Creek, and Wooden Thigh Creek had fish present (Table 2). A rock bass (*Ambloplites rupestris*) was captured in a beaver pond on Crazy Head Fork (Table 2), which was the lone observation of this species during 2007 prairie stream sampling. Pumpkin Creek is included in the CBM repeat sites and will be summarized later in this report.

10090207 – Middle Powder

The two sites surveyed within this HUC were Bloom Creek and Dry Creek. Both sites were dry (Table 6) and no fish or herpetofauna were observed at either site.

10090208 – Little Powder

Two streams were sampled, including the Little Powder River (sampled twice) and Scott Creek. Little Powder River is included in the CBM repeat sites and will be summarized later in this report. Scott Creek held interrupted standing pools of water (Table 6) where plains spadefoot (*Spea bombifrons*) tadpoles were observed (Table 4).

10090209 – Lower Powder

Four sites were surveyed within this HUC that included Archdale Creek, Cox Creek, Long Prong Locote Creek, and Spring Creek. Spring Creek is included in the CBM repeat sites and will be summarized later in this report. Archdale Creek held interrupted

standing pools of water (Table 6) where tiger salamanders and woodhouse's toads (*Bufo woodhousii*) were observed (Table 4). Cox Creek and Long Prong Locust Creek were both dry (Table 6).

10090210 – Mizpah

Six sites were surveyed, including: Ash Creek, Big Bobcat Creek, Dick Creek, Hudson Creek, Lake Creek, and Mud Spring Creek. Four sites were dry and two sites held interrupted standing pools of water (Table 6, Figure 3). Herpetofauna was observed at Ash Creek, Big Bobcat Creek, and Dick Creek (Table 4). No fish were observed at any of these sites.

10100001 – Lower Yellowstone-Sunday

Thirteen sites on 12 streams were surveyed, including: Bone Coulee, Caprock Coulee, Cottonwood Creek, Cox Coulee, Donley Coulee, Geyser Spring Coulee, Horse Creek, McGraw Coulee, Rainwater Coulee, Sarpy Creek, Slaughterhouse Creek, and West Muggins Creek. Sarpy Creek is included in the CBM repeat sites and will be summarized later in this report. Cottonwood Creek had flowing water where 16 species of fish were observed (Table 2, Figure 4). Cottonwood Creek had the greatest fish species diversity of all Region 7 prairie streams sampled in 2007 (Figure 4). In addition, two species of herpetofauna were observed at Cottonwood Creek (Table 4).

10100002 – Big Porcupine

Three sites sampled in this HUC included East Blacktail Creek, Living Ash Creek, and Sun Coulee. Eight plains spadefoot tadpoles were observed in an interrupted standing pool in East Blacktail Creek (Table 4). Living Ash Creek and Sun Coulee were both dry (Table 6).

10100003 – Rosebud

Ten surveys were performed within this HUC. Three CBM repeat sites on Rosebud Creek were sampled twice in 2007 and results will be summarized later in this report. Alderson Creek, East Fork Muddy Creek, Lane Deer Creek, and Muddy Creek were also sampled within this HUC that lied within the external boundaries of the Northern Cheyenne Indian Reservation. Fish were found in all four tributaries (Table 2). Lane Deer Creek and Muddy Creek were sampled by Elser (1980). Only fathead minnows were found in Lane Deer Creek during 2007 sampling efforts; whereas, Elser (1980) found lake chubs (*Couesius plumbeus*), fathead minnows, longnose dace (*Rhinichthys cataractae*), white suckers (*Catostomous commersoni*), and mountain suckers (*Catostomous platyrhynchus*). Fathead minnows, lake chubs, and white suckers were observed in Muddy Creek in 2007, while Elser (1980) observed lake chubs, longnose dace, and white suckers. Herpetofauna was observed at most sites within this drainage as seen in Table 4.

10100004 – Lower Yellowstone

Eleven sites were surveyed within this HUC, including: Cigar Creek, Coal Creek, Crane Creek, Hay Creek, Hodges Creek, O'Brien Creek, Plenty Creek, Robertson Creek, Stouts Creek, War Dance Creek, and Whoopup Creek. Two species of fish were observed at O'Brien Creek (Table 2) in addition to three species of herpetofauna (Table 4). Fish were not observed at any other site within this HUC. Amphibians were observed at Coal Creek, Hodges Creek, and Plenty Creek (Table 4). Both O'Brien Creek and Hodges Creek had prior sampling by Elser (1980).

10100005 – O'Fallon

Alkali Creek, Dry Creek, and Lone Tree Creek were surveyed within this HUC. Dry Creek and Lone Tree Creek were both dry (Table 6). Five species of fish were observed at Alkali Creek (Table 2) in addition to three species of herpetofauna (Table 4).

10110201 – Upper Little Missouri

Five streams were sampled, including: Blacktail Creek, Flasted Draw, Hackberry Creek, North Thompson Creek, and Sand Creek. Fathead minnows and green sunfish were observed at Hackberry Creek (Table 2), while black bullheads (*Ameiurus melas*), fathead minnows, lake chubs, and largemouth bass (*Micropterus salmoides*) were captured at North Thompson Creek (Table 2). Fish were not present at any other site sampled within this HUC. Herpetofauna was observed at all sites except for Flasted Draw (Table 4).

10110202 – Boxelder

Nine streams were surveyed within this HUC, including: Big Ramme Creek, Coal Creek, two separate Corral Creeks, Freshwater Draw, Lone Tree Creek, McCarty Creek, West Fork Boxelder Creek, and Whitetail Creek. Sampling at Coal Creek produced three species of fish (Table 2) and five species of herpetofauna (Table 4). Both Corral Creeks had fish and amphibians present (Table 2, Table 4). Lone Tree Creek had seven species of fish present (Table 2) including black bullheads, brassy minnows (*Hybognathus hankinsoni*), common carp (*Cyprinus carpio*), fathead minnow, golden shiners (*Notemigonus crysoleucas*), green sunfish, and northern pike (*Esox lucius*). McCarty Creek had five species of fish and Whitetail Creek held six species of fish (Table 2, Figure 4). Herpetofauna was observed at all sites except for Freshwater Draw and West Fork Boxelder Creek (Table 4).

10110204 - Beaver

Yates Creek was the only site sampled within this HUC. Brook stickleback (*Culaea inconstans*) were the only fish present here. Yates Creek had the highest conductivity (10,780 μ S) and salinity (6.1 ppt) of any site where fish were observed during 2007 Region 7 prairie stream sampling (Table 5). One hundred and forty-six tiger salamander larvae were also captured here during seine hauls (Table 4).

Prairie Stream Surveys 2007 – Region 7

Table 1. Fish species captured during Region 7 prairie stream surveys, May – September 2007.

Family	Species	Origin	Number Observed	Percent of Total Observed ¹	Number of Sites Where Observed	Percent of Sites Where Observed ¹	Number of Streams Where Observed	Percent of Streams Where Observed ¹
Mooneye	Hiodontidae							
goldeye	<i>Hiodon alosoides</i>	Native	6	0%	3	7%	3	9%
Sucker	Catostomidae							
white sucker	<i>Catostomus commersoni</i>	Native	608	4%	19	42%	11	33%
river carpsucker	<i>Carpionodes carpio</i>	Native	41	0%	4	9%	3	9%
shorthead	<i>Moxostoma</i>	Native	18	0%	3	7%	2	6%
redhorse	<i>macrolepidotum</i>							
longnose sucker	<i>Catostomus catostomus</i>	Native	7	0%	1	2%	1	3%
bigmouth buffalo	<i>Ictiobus cyprinellus</i>	Native	1	0%	1	2%	1	3%
Minnow	Cyprinidae							
fathead minnow	<i>Pimephales promelas</i>	Native	8,611	51%	42	93%	28	85%
plains minnow	<i>Hybognathus placitus</i>	Native	1,380	8%	11	24%	8	24%
lake chub	<i>Couesius plumbeus</i>	Native	1,012	6%	11	24%	7	21%
western	<i>Hybognathus spp.</i>	Native	733	4%				
silvery/plains minnow								
sand shiner	<i>Notropis stramineus</i>	Native	650	4%	9	20%	6	18%
creek chub	<i>Semotilus atromaculatus</i>	Native	287	2%	6	13%	4	12%
longnose dace	<i>Rhinichthys cataractae</i>	Native	260	2%	7	16%	4	12%
common carp	<i>Cyprinus carpio</i>	Introduced	106	1%	11	24%	8	24%
western silvery minnow	<i>Hybognathus argyritis</i>	Native	88	1%	5	11%	3	9%
brassy minnow	<i>Hybognathus hankinsoni</i>	Native	84	0%	9	20%	8	24%
flathead chub	<i>Platygobio gracilis</i>	Native	51	0%	5	11%	4	12%
golden shiner	<i>Notemigonus crysoleucas</i>	Introduced	40	0%	4	9%	4	12%
Killifish	Cyprinodontidae							
plains killifish	<i>Fundulus zebrinus</i>	Introduced	80	1%	4	9%	3	9%
Pike	Esocidae							
northern pike	<i>Esox lucius</i>	Introduced	1	0%	1	2%	1	3%
Bullhead Catfish	Ictaluridae							
black bullhead	<i>Ameiurus melas</i>	Introduced	419	2%	12	27%	9	27%
channel catfish	<i>Ictalurus punctatus</i>	Native	174	1%	6	13%	4	12%
stonecat	<i>Noturus flavus</i>	Native	1	0%	1	2%	1	3%
Stickleback	Gasterosteidae							
brook stickleback	<i>Culaea inconstans</i>	Native	198	1%	5	11%	5	15%
Sunfish	Centrarchidae							
green sunfish	<i>Lepomis cyanellus</i>	Introduced	1,942	12%	19	42%	14	42%
black crappie	<i>Pomoxis nigromaculatus</i>	Introduced	10	0%	1	2%	1	3%
largemouth bass	<i>Micropterus salmoides</i>	Introduced	2	0%	1	2%	1	3%
smallmouth bass	<i>Micropterus dolomieu</i>	Introduced	2	0%	1	2%	1	3%
rock bass	<i>Ambloplites rupestris</i>	Introduced	1	0%	1	2%	1	3%
Perch	Percidae							
yellow perch	<i>Perca flavescens</i>	Introduced	40	0%	2	4%	2	6%
Total			16,853					

¹ to nearest 1%

Prairie Stream Surveys 2007 – Region 7

Table 2. Statistics of fish observed by HUC and site during prairie stream surveys, May –September 2007.

HUC (Drainage)	Site Name	Date	Species	N	Total Length (mm)		
					Min	Max	Mean
10040104 Fort Peck Reservoir	Big Dry Creek	6/12/2007	channel catfish	10	111	470	314.5
			common carp	7	178	480	265.9
			creek chub	18	66	100	78.1
			fathead minnow	428	43	70	49.7
			flathead chub	36	87	122	102.3
			goldeye	1	341	341	341.0
			longnose dace	22	56	69	61.6
			plains minnow	254	65	102	83.2
			sand shiner	26	44	57	48.9
			white sucker	1	137	137	137.0
10040106 Big Dry	Lone Tree Creek	8/2/2007	fathead minnow	836	31	68	50.4
			lake chub	385	38	97	54.8
			plains minnow	871	32	104	63.9
			sand shiner	1	65	65	65.0
10040202 Middle Musselshell	Big Breed Creek	7/9/2007	black crappie	10	141	165	152.8
			fathead minnow	662	37	77	56.2
			plains minnow	2	81	86	83.5
			yellow perch	39	114	175	136.4
10040202 Middle Musselshell	Orchard Coulee	7/11/2007	brassy minnow	1	74	74	74.0
			common carp	8	97	660	235.5
			fathead minnow	30	22	64	45.1
			green sunfish	8	22	138	83.6
			plains minnow	24	82	99	95.1
10090101 Upper Tongue	Hanging Woman Creek *	5/10/2007	black bullhead	1	106	106	106.0
			brassy minnow	7	68	88	80.4
			common carp	1	266	266	266.0
			fathead minnow	219	51	70	61.1
			green sunfish	36	39	106	72.1
			white sucker	3	103	263	179.7
10090101 Upper Tongue	Hanging Woman Creek *	9/4/2007	black bullhead	7	47	58	52.1
			brassy minnow	63	45	85	66.7
			common carp	38	82	162	116.0
			fathead minnow	288	28	78	53.5
			green sunfish	163	35	131	70.8
			white sucker	72	92	145	112.7

*CBM Repeat Site

Prairie Stream Surveys 2007 – Region 7

Table 2- continued.

HUC (Drainage)	Site Name	Date	Species	N	Total Length (mm)		
					Min	Max	Mean
10090101 Upper Tongue	Youngs Creek *	5/9/2007	creek chub	76	36	186	89.0
			fathead minnow	15	53	75	63.3
			longnose dace	87	38	95	63.1
			white sucker	41	51	219	108.2
10090101 Upper Tongue	Youngs Creek *	8/20/2007	brassy minnow	3	46	50	48.7
			creek chub	90	29	194	90.8
			fathead minnow	6	27	67	53.3
			longnose dace	88	41	103	76.2
			white sucker	21	41	247	115.7
10090102 Lower Tongue	Ash Creek	6/13/2007	fathead minnow	3	62	73	69.3
10090102 Lower Tongue	Crazy Head Fork	8/10/2007	brook stickleback	37	30	54	42.8
			fathead minnow	126	48	88	60.4
			rock bass	1	205	205	205.0
10090102 Lower Tongue	Logging Creek (site #1)	8/10/2007	fathead minnow	6	29	54	35.6
10090102 Lower Tongue	Logging Creek (site #2)	8/10/2007	fathead minnow	20	---	---	---
10090102 Lower Tongue	North Fork Taylor Creek	7/17/2007	lake chub	196	22	107	45.5
			white sucker	1	29	29	29.0
10090102 Lower Tongue	Pumpkin Creek *	5/16/2007	brassy minnow	4	46	63	55.3
			channel catfish	1	184	184	184.0
			common carp	1	134	134	134.0
			fathead minnow	221	40	64	48.2
			flathead chub	1	125	125	125.0
			goldeye	3	305	334	323.0
			green sunfish	2	112	113	112.5
			plains minnow	51	66	100	84.5
			sand shiner	67	42	60	50.7
			western silvery minnow	22	109	139	121.2

* CBM Repeat Site

Prairie Stream Surveys 2007 – Region 7

Table 2- continued.

HUC (Drainage)	Site Name	Date	Species	N	Total Length (mm)		
					Min	Max	Mean
10090102 Lower Tongue	Pumpkin Creek *	8/13/07	bigmouth buffalo	1	38	38	38.0
			channel catfish	53	53	700	186.7
			common carp	9	34	256	92.7
			fathead minnow	876	39	60	50.3
			green sunfish	14	21	86	48.0
			lake chub	4	44	49	46.0
			plains minnow	3	48	83	70.0
			river carpsucker	5	139	155	145.8
			sand shiner	23	27	58	50.2
			western silvery minnow	27	100	123	112.1
			white sucker	2	160	185	172.5
10090102 Lower Tongue	Taylor Creek	7/17/2007	lake chub	27	17	86	30.0
10090102 Lower Tongue	Wooden Thigh Creek (site #2)	8/10/2007	fathead minnow	77	48	67	57.0
10090208 Little Powder	Little Powder River *	6/6/2007	black bullhead	28	67	188	86.4
			channel catfish	16	68	270	106.9
			common carp	5	60	264	170.2
			fathead minnow	116	38	78	52.1
			flathead chub	2	106	108	107.0
			green sunfish	10	38	81	63.0
			plains minnow	49	84	113	93.3
			river carpsucker	4	127	382	218.5
			sand shiner	108	34	66	50.2
			shorthead redhorse	3	133	173	149.0
			stonecat	1	85	85	85.0
			western silvery minnow	16	99	140	114.0
			white sucker	12	99	234	198.4
10090208 Little Powder	Little Powder River *	8/14/2007	black bullhead	13	39	124	73.2
			channel catfish	64	48	590	120.4
			common carp	21	80	290	137.5
			fathead minnow	60	48	66	57.4
			flathead chub	2	125	175	150.0
			goldeye	2	295	342	318.5
			green sunfish	1	65	65	65.0
			longnose dace	1	80	80	80.0
			plains minnow	1	67	67	67.0
			river carpsucker	5	166	243	204.2
			sand shiner	115	49	62	54.5
			shorthead redhorse	6	177	288	214.7
			western silvery minnow	1	127	127	127.0
			white sucker	12	123	285	199.6

* CBM Repeat Site

Prairie Stream Surveys 2007 – Region 7

Table 2- continued.

HUC (Drainage)	Site Name	Date	Species	N	Total Length (mm)		
					Min	Max	Mean
10090209 Lower Powder	Spring Creek *	6/11/2007	black bullhead	7	71	141	107.4
			creek chub	2	81	186	133.5
			fathead minnow	33	33	62	50.8
			green sunfish	13	44	108	63.1
			plains killifish	12	48	68	53.6
			plains minnow	60	87	112	94.2
			sand shiner	143	40	64	51.6
10090209 Lower Powder	Spring Creek *	8/15/2007	black bullhead	296	31	227	56.2
			common carp	7	110	140	120.9
			creek chub	9	34	80	49.4
			fathead minnow	56	29	61	42.4
			green sunfish	61	23	104	60.7
			plains killifish	62	28	78	47.9
			plains minnow	33	44	110	72.4
10100001 Lower Yellowstone-Sunday	Cottonwood Creek	8/7/2007	sand shiner	71	27	70	44.0
			black bullhead	3	174	253	208.0
			channel catfish	30	49	70	62.2
			common carp	8	91	475	190.8
			creek chub	92	57	145	104.1
			fathead minnow	442	41	68	58.3
			flathead chub	10	43	50	47.2
			green sunfish	1	105	105	105.0
			longnose sucker	7	73	88	78.9
			plains killifish	4	51	66	60.3
			plains minnow	32	75	90	83.5
			river carpsucker	27	45	135	87.2
			sand shiner	96	52	66	58.0
			shorthead redhorse	9	32	45	39.4
			smallmouth bass	2	75	124	99.5
			western silvery minnow	22	85	95	89.1
			white sucker	21	89	190	150.4
			western silvery/plains minnow	733	---	---	---
10100001 Lower Yellowstone-Sunday	Sarpy Creek *	6/4/2007	fathead minnow	3	69	72	70.7
			fathead minnow	34	56	75	63.8
10100001 Lower Yellowstone-Sunday	Sarpy Creek *	9/6/2007	green sunfish	1,596	34	113	49.3
			fathead minnow	18	27	70	46.3
10100003 Rosebud	Alderson Creek	8/9/2007	fathead minnow	27	41	79	60.3

* CBM Repeat Site

Prairie Stream Surveys 2007 – Region 7

Table 2- continued.

HUC (Drainage)	Site Name	Date	Species	N	Total Length (mm)		
					Min	Max	Mean
10100003 Rosebud	East Fork Muddy Creek	8/9/2007	fathead minnow	5	61	74	66.4
10100003 Rosebud	Lame Deer Creek	8/9/2007	fathead minnow	27	51	63	56.4
10100003 Rosebud	Muddy Creek	8/9/2007	fathead minnow	42	27	77	60.2
			lake chub	13	35	54	48.3
			white sucker	5	61	65	63.8
10100003 Rosebud	Rosebud Creek site #1 *	5/8/2007	fathead minnow	39	34	67	45.2
			white sucker	26	40	259	78.5
10100003 Rosebud	Rosebud Creek site #1 *	8/21/2007	fathead minnow	294	32	66	51.6
			lake chub	100	30	92	67.6
			longnose dace	35	29	85	62.7
			white sucker	137	42	240	105.3
10100003 Rosebud	Rosebud Creek site #2 *	5/8/2007	fathead minnow	166	45	68	56.8
			lake chub	4	66	71	68.3
			white sucker	21	73	276	98.5
10100003 Rosebud	Rosebud Creek site #2 *	8/21/2007	fathead minnow	229	32	73	58.3
			lake chub	24	25	53	40.6
			white sucker	40	48	177	115.6
10100003 Rosebud	Rosebud Creek site #3 *	5/9/2007	fathead minnow	158	40	70	50.2
			lake chub	90	39	97	61.8
			longnose dace	10	32	65	47.9
			white sucker	56	43	173	84.1
10100003 Rosebud	Rosebud Creek site #3 *	8/21/2007	fathead minnow	179	36	67	55.1
			lake chub	146	38	113	78.1
			longnose dace	17	31	78	59.8
			white sucker	132	75	240	123.2

* CBM Repeat Site

Prairie Stream Surveys 2007 – Region 7

Table 2- continued.

HUC (Drainage)	Site Name	Date	Species	N	Total Length (mm)		
					Min	Max	Mean
10100004 Lower Yellowstone	O'Brien Creek	6/5/2007	brook stickleback	78	46	66	54.9
			fathead minnow	224	49	68	55.9
10100005 O'Fallon	Alkali Creek	6/28/2007	brassy minnow	1	75	75	75.0
			brook stickleback	2	46	57	51.5
			fathead minnow	572	34	72	58.7
			green sunfish	1	88	88	88.0
			white sucker	4	35	44	38.8
10110201 Upper Little Missouri	Hackberry Creek	6/26/2007	fathead minnow	66	61	78	65.4
			green sunfish	1	88	88	88.0
10110201 Upper Little Missouri	North Thompson Creek	6/18/2007	black bullhead	9	66	137	101.0
			fathead minnow	1,272	41	73	50.9
			lake chub	23	72	97	83.7
			largemouth bass	2	228	290	259.0
10110202 Boxelder	Coal Creek	6/21/2007	fathead minnow	332	22	69	51.0
			green sunfish	1	90	90	90.0
			plains killifish	2	28	31	29.5
10110202 Boxelder	Corral Creek	6/20/2007	black bullhead	20	64	162	117.5
			brassy minnow	1	58	58	58.0
			fathead minnow	124	38	70	52.1
			golden shiner	27	45	95	63.5
			green sunfish	7	54	121	84.7
10110202 Boxelder	Corral Creek	6/25/2007	fathead minnow	29	22	32	27.6
			green sunfish	2	102	104	103.0
10110202 Boxelder	Lone Tree Creek	6/27/2007	black bullhead	21	65	170	114.7
			brassy minnow	1	94	94	94.0
			common carp	1	34	34	34.0
			fathead minnow	163	27	69	52.1
			golden shiner	1	70	70	70.0
			green sunfish	16	64	117	83.4
			northern pike	1	126	126	126.0
10110202 Boxelder	McCarty Creek	6/20/2007	black bullhead	10	57	163	77.9
			fathead minnow	10	56	67	62.5
			golden shiner	1	50	50	50.0
			green sunfish	1	124	124	124.0
			yellow perch	1	79	79	79.0
10110202 Boxelder	Whitetail Creek	6/19/2007	black bullhead	4	116	184	147.5
			brassy minnow	3	57	87	74.0
			fathead minnow	96	29	76	53.3
			golden shiner	11	50	78	64.7
			green sunfish	8	43	68	53.3
			white sucker	1	128	128	128.0

Prairie Stream Surveys 2007 – Region 7

Table 2- continued.

HUC (Drainage)	Site Name	Date	Species	N	Total Length (mm)		
					Min	Max	Mean
10110204 Beaver	Yates Creek	8/1/2007	brook stickleback	63	27	62	50.5

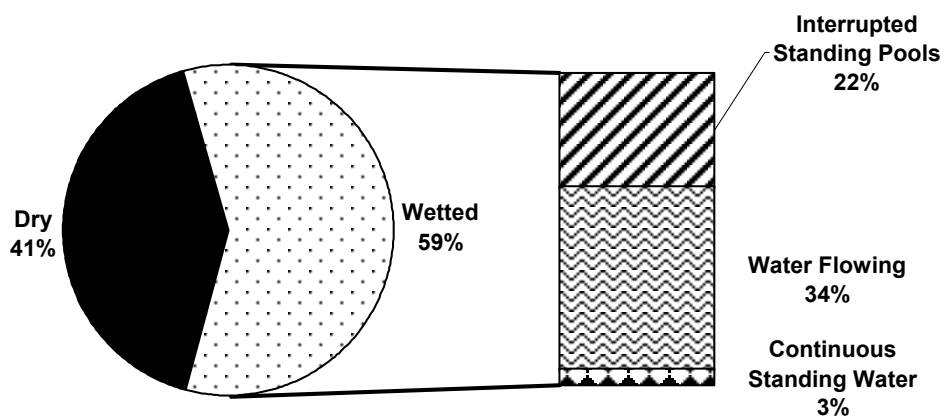


Figure 2. Percent water types observed in Region 7 prairie stream surveys, May - September 2007.

Table 3. Reptiles and amphibians observed while conducting prairie stream surveys, May – September 2007.

Family Common Name	Species	Number of Sites Where Observed	Total Number Individuals Observed
Ambystomatidae (mole salamanders)			
tiger salamander	<i>Ambystoma tigrinum</i>	20	613
Buфонidae (true toads)			
great plains toad	<i>Bufo cognatus</i>	1	2
woodhouse's toad	<i>Bufo woodhousii</i>	15	421
Chelydridae (snapping turtles)			
snapping turtle	<i>Chelydra serpentina</i>	5	5
Colubridae (colubrids)			
common garter snake	<i>Thamnophis sirtalis</i>	2	2
eastern racer	<i>Coluber constrictor</i>	2	2
gopher (bull) snake	<i>Pituophis catenifer</i>	6	6
plains garter snake	<i>Thamnophis radix</i>	12	17
terrestrial garter snake	<i>Thamnophis elegans</i>	1	1
Emydidae (pond turtles)			
painted turtle	<i>Chrysemys picta</i>	6	17
Hylidae (treefrogs)			
boreal chorus frog	<i>Pseudacris maculata</i>	12	84
Pelobatidae (spadefoots)			
plains spadefoot	<i>Spea bombifrons</i>	4	17
Ranidae (true frogs)			
northern leopard frog	<i>Rana pipiens</i>	34	688
Viperidae (vipers)			
western rattlesnake	<i>Crotalus viridis</i>	4	4

Prairie Stream Surveys 2007 – Region 7

Table 4. Reptiles and amphibians observed by HUC and survey site during prairie stream surveys, May –September 2007.

Site Name		Date	Species	Number of Immatures and/or Adults	Number of Larvae
HUC (Drainage)					
10040104 Fort Peck Reservoir	Snap Creek	6/12/2007	boreal chorus frog tiger salamander	2	3
10040106 Little Dry	Lone Tree Creek	8/2/2007	common garter snake great plains toad northern leopard frog tiger salamander	1 2 25	8
10040202 Middle Musselshell	Big Breed Creek	7/9/2007	boreal chorus frog tiger salamander		2 1
10040202 Middle Musselshell	Orchard Coulee	7/11/2007	plains garter snake	2	
10040205 Lower Musselshell	Skeleton Creek	7/11/2007	boreal chorus frog tiger salamander	1	89
10090101 Upper Tongue	Hanging Woman Creek *	5/10/2007	northern leopard frog painted turtle	2 5	
10090101 Upper Tongue	Hanging Woman Creek *	9/4/2007	northern leopard frog	8	
10090101 Upper Tongue	Waddle Creek *	5/10/2007	boreal chorus frog tiger salamander	1	20
10090101 Upper Tongue	Youngs Creek *	5/9/2007	terrestrial garter snake	1	
10090101 Upper Tongue	Youngs Creek *	8/20/2007	northern leopard frog	75+	
10090102 Lower Tongue	Ash Creek	6/13/2007	plains spadefoot tiger salamander		5 55
10090102 Lower Tongue	Crazy Head Fork	8/10/2007	northern leopard frog woodhouse's toad	28 1	
10090102 Lower Tongue	King Creek	7/16/2007	woodhouse's toad	7	230
10090102 Lower Tongue	Logging Creek site #1	8/10/2007	tiger salamander woodhouse's toad	20	28 3

* CBM Repeat Site

Prairie Stream Surveys 2007 – Region 7

Table 4 – continued.

Site Name		Date	Species	Number of Immatures and/or Adults	Number of Larvae
HUC (Drainage)					
10090102 Lower Tongue	Logging Creek site #2	8/10/2007	northern leopard frog woodhouse's toad	16 3	
10090102 Lower Tongue	Paget Creek	7/16/2007	woodhouse's toad	3	126
10090102 Lower Tongue	Pumpkin Creek *	5/16/2007	common garter snake woodhouse's toad	1 2	
10090102 Lower Tongue	Pumpkin Creek *	8/13/2007	northern leopard frog painted turtle woodhouse's toad	5 4 1	
10090102 Lower Tongue	Taylor Creek	7/17/2007	tiger salamander woodhouse's toad	2	1
10090102 Lower Tongue	White Horse Spring	8/10/2007	tiger salamander		1
10090102 Lower Tongue	Wooden Thigh Creek site #2	8/10/2007	woodhouse's toad	4	
10090208 Little Powder	Little Powder River *	6/6/2007	snapping turtle	1	
10090208 Little Powder	Little Powder River *	8/14/2007	northern leopard frog woodhouse's toad	1 1	
10090208 Little Powder	Scott Creek	6/19/2007	plains spadefoot		2
10090209 Lower Powder	Archdale Creek	7/30/2007	tiger salamander woodhouse's toad	46 6	
10090209 Lower Powder	Spring Creek *	6/11/2007	northern leopard frog plains garter snake woodhouse's toad	1 1 2	
10090209 Lower Powder	Spring Creek *	8/15/2007	northern leopard frog plains garter snake snapping turtle	12 3 1	
10090210 Mizpah	Ash Creek	6/6/2007	gopher snake	1	

* CBM Repeat Site

Prairie Stream Surveys 2007 – Region 7

Table 4 – continued.

Site Name				Number of Immatures and/or Adults	Number of Larvae
HUC (Drainage)	Date	Species			
10090210 Mizpah	Big Bobcat Creek 7/18/2007	tiger salamander			3
10090210 Mizpah	Dick Creek 7/18/2007	plains garter snake tiger salamander	1		1
10100001 Lower Yellowstone-Sunday	Cottonwood Creek 8/7/2007	plains garter snake woodhouse's toad	1 1		
10100001 Lower Yellowstone-Sunday	McGraw Coulee 6/14/2007	plains garter snake	2		
10100001 Lower Yellowstone-Sunday	Sarpy Creek *	northern leopard frog tiger salamander woodhouse's toad			6 24 25
10100001 Lower Yellowstone-Sunday	Sarpy Creek *	northern leopard frog painted turtle snapping turtle	8 1 1		
10100002 Big Porcupine	East Blacktail Creek 6/14/2007	plains spadefoot			8
10100003 Rosebud	East Fork Muddy Creek 8/9/2007	tiger salamander woodhouse's toad	1		63
10100003 Rosebud	Lame Deer Creek 8/9/2007	northern leopard frog	2		
10100003 Rosebud	Muddy Creek 8/9/2007	northern leopard frog tiger salamander	42		68
10100003 Rosebud	Rosebud Creek site #1 * 8/21/2007	northern leopard frog	13		
10100003 Rosebud	Rosebud Creek site #2 * 5/8/2007	northern leopard frog	3		
10100003 Rosebud	Rosebud Creek site #2 * 8/21/2007	northern leopard frog plains garter snake	22 1		
10100003 Rosebud	Rosebud Creek site #3 * 5/9/2007	northern leopard frog painted turtle	2 1		
10100003 Rosebud	Rosebud Creek site #3 * 8/21/2007	northern leopard frog	40		

* CBM Repeat Site

Prairie Stream Surveys 2007 – Region 7

Table 4 – continued.

Site Name		Date	Species	Number of Immatures and/or Adults	Number of Larvae
HUC (Drainage)					
10100004 Lower Yellowstone	Coal Creek	5/17/2007	boreal chorus frog	2	
10100004 Lower Yellowstone	Hodges Creek	8/1/2007	northern leopard frog	126	
10100004 Lower Yellowstone	O'Brien Creek	6/5/2007	northern leopard frog		2
			painted turtle	5	
			plains garter snake	1	
10100004 Lower Yellowstone	Plenty Creek	7/31/2007	boreal chorus frog		8
10100005 O'Fallon	Alkali Creek	6/28/2007	northern leopard frog	4	2
			plains garter snake	1	
			tiger salamander		17
10110201 Upper Little Missouri	Blacktail Creek	6/26/2007	boreal chorus frog		6
			northern leopard frog	1	
10110201 Upper Little Missouri	Hackberry Creek	6/26/2007	northern leopard frog	2	
10110201 Upper Little Missouri	North Thompson Creek	6/18/2007	northern leopard frog	8	
10110201 Upper Little Missouri	Sand Creek	6/26/2007	northern leopard frog	6	
10110202 Boxelder	Big Ramme Creek	6/27/2007	boreal chorus frog	5	
			northern leopard frog	1	
10110202 Boxelder	Coal Creek	6/21/2007	boreal chorus frog		6
			northern leopard frog	5	173
			snapping turtle	1	
			tiger salamander		31
10110202 Boxelder	Corral Creek	6/20/2007	northern leopard frog	1	
10110202 Boxelder	Corral Creek	6/25/2007	boreal chorus frog		38
			northern leopard frog	5	12
			tiger salamander		7
10110202 Boxelder	Lone Tree Creek	6/27/2007	boreal chorus frog	6	
			northern leopard frog	3	1

Table 4 – continued.

HUC (Drainage)	Site Name	Date	Species	Number of Immatures and/or Adults	Number of Larvae
10110202 Boxelder	McCarty Creek	6/20/2007	northern leopard frog plains garter snake plains spadefoot	3 2	2
10110202 Boxelder	Whitetail Creek	6/19/2007	boreal chorus frog northern leopard frog	1 1	
10110204 Beaver	Yates Creek	8/1/2007	tiger salamander		146

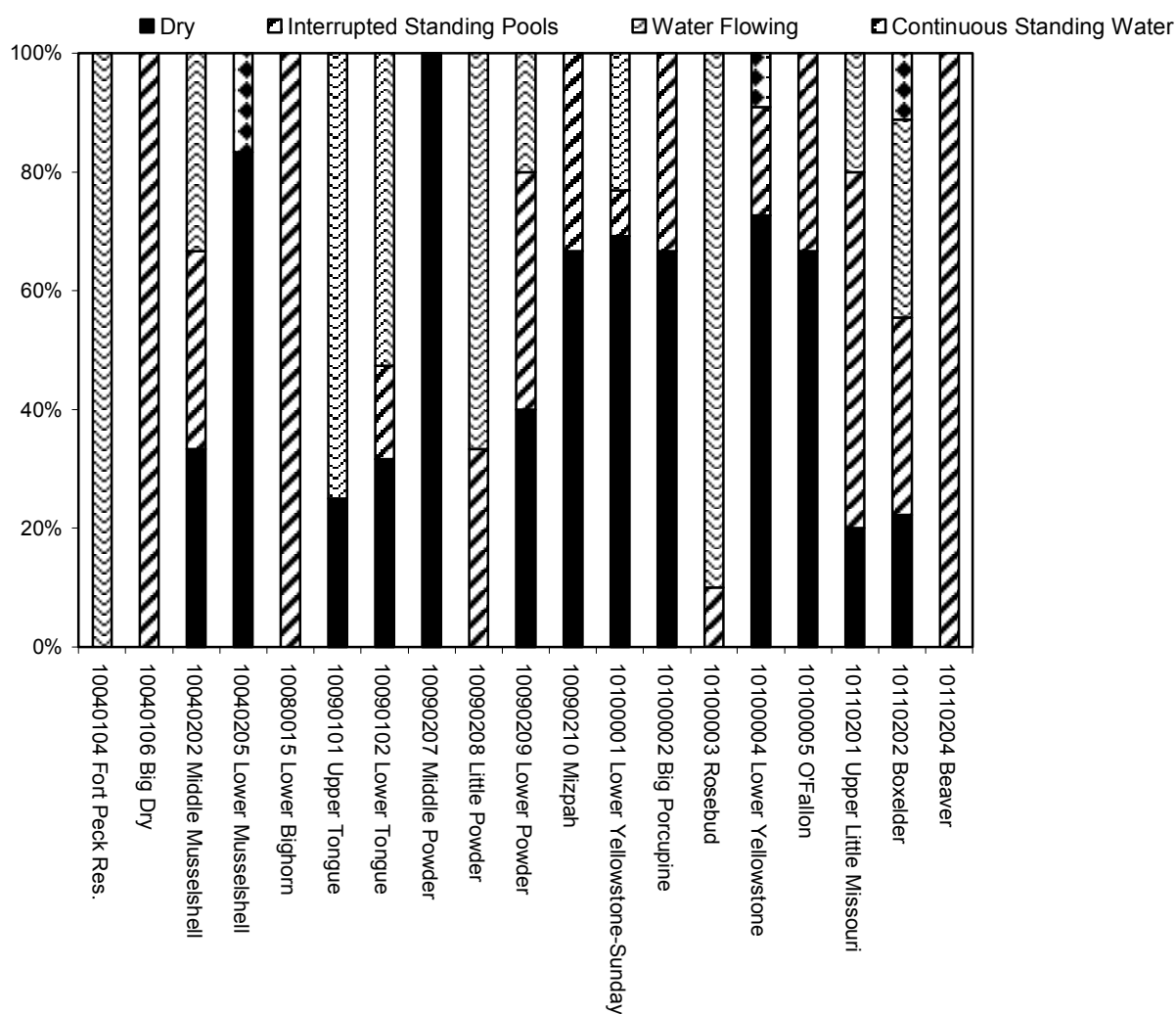


Figure 3. Water types observed by HUC during Region 7 prairie stream surveys, May - September 2007.

Prairie Stream Surveys 2007 – Region 7

Table 5. Water quality and length statistics of fish species captured during Region 7 prairie stream surveys, May – September 2007.

Species	Number of Observations	N	Mean Total Length (mm)	Ranges							
				Total Length (mm)	Water Temperature (°C)	pH	Salinity (ppt)	Conductivity (µS)	Dissolved Oxygen (mg/l)	Dissolved Oxygen (%)	Turbidity (NTU)
bigmouth buffalo	1	1	38.0	38	22.3	9.0	3.3	6,010	7.76	93.0	49
black bullhead	12	419	94.0	31 - 253	17.4 - 26.7	7.58 - 10.6	0.1 - 2.1	275.4 - 3,925	5.11 - 9.89	57.7 - 126.2	5.88 - 1,000
black crappie	1	10	152.8	141 – 165	22.8	8.75	0.9	1,841	7.46	87.1	14
brassy minnow	9	84	67.9	45 – 94	14.8 – 26.4	7.58 – 9.6	0.1 – 1.9	275.4 – 3,570	5.11 – 11.29	57.7 – 149.6	5.88 - 270
brook stickleback	5	198	48.7	27 – 70	17.7 – 28.5	7.37 – 9.57	0.3 – 6.1	539 – 10,780	4.0 – 10.64	46.4 - 116	6 – 50
channel catfish	6	174	143.2	48 – 700	15.4 – 23.6	7.73 – 9.0	0.4 – 3.3	759 – 6,010	6.44 – 8.14	70.4 – 93.2	14 – 1,000
common carp	11	106	152.7	34 – 660	15.4 – 26.4	7.58 – 10.6	0.1 – 3.3	275.4 – 6,010	6.32 – 11.29	69.9 – 149.6	5.88 – 1,000
creek chub	6	287	87.6	29 – 194	14.8 – 26.7	8.04 – 10.6	0.3 – 1.4	632 – 2,640	7.07 – 9.2	77.1 – 98.8	14 – 200
fathead minnow	42	8,611	53.6	22 – 88	10.3 – 31.7	7.37 – 10.6	0.1 – 3.3	275.4 – 6,010	1.85 – 13.55	22.5 – 150.7	3.4 – 1,000
flathead chub	5	51	90.2	43 – 175	15.4 – 23.6	7.73 – 9.0	0.4 – 2.1	759 – 3,925	6.44 – 8.14	70.4 – 93.2	14 – 1,000
golden shiner	4	40	63.7	45 – 95	17.4 – 26.4	7.58 – 9.0	0.1 – 0.5	275.4 – 2,949	5.11 – 9.89	57.7 – 126.2	29 - 270
goldeye	3	6	324.5	295 – 342	15.4 – 23.6	8.26 – 9.0	0.5 – 2.1	998 – 3,925	7.26 – 8.14	82 – 93.2	20 – 200
green sunfish	19	1,942	67.5	21 – 138	15.4 – 26.7	7.58 – 10.6	0.1 – 3.3	275.4 – 6,010	1.85 – 11.29	26 – 149.6	5.88 – 1,000
lake chub	11	1,012	57.5	17 – 113	13.1 – 25.8	7.97 – 9.3	0.4 – 3.3	784 – 6,010	3.85 – 10.98	40.6 - 113	3.4 – 55
largemouth bass	1	2	259	228 – 290	18.8	7.97	0.7	1,344	6.37	68.2	13
longnose dace	7	260	63.3	29 – 103	13.1 – 23.6	8.26 – 9.6	0.3 – 2.1	632 – 3,925	3.85 – 9.2	40.6 – 93.2	3.4 - 200
longnose sucker	1	7	78.8	73 – 88	23.2	8.6	0.4	759	7.67	90.1	14
northern pike	1	1	126.0	126	26.4	7.58	0.1	275.4	8.0	93.3	270
plains killifish	4	80	50.0	28 - 78	19.8 – 26.7	8.04 – 10.6	0.4 – 1.4	759 – 2,640	1.85 – 8.74	26 – 98.8	14 – 59.6
plains minnow	11	1,380	80.8	32 - 113	15.4 – 26.7	7.73 – 10.6	0.4 – 3.3	759 – 6,010	6.44 – 11.29	70.4 – 149.6	7.8 – 1,000
river carpsucker	4	41	128.4	45 – 382	20.9 – 23.2	7.73 – 9.0	0.4 – 3.3	759 – 6,010	6.44 – 7.76	70.4 - 93	14 – 1,000

Prairie Stream Surveys 2007 – Region 7

Table 5 – continued.

Species	Number of Observations	N	Mean Total Length (mm)	Ranges							
				Total Length (mm)	Water Temperature (°C)	pH	Salinity (ppt)	Conductivity (µS)	Dissolved Oxygen (mg/l)	Dissolved Oxygen (%)	Turbidity (NTU)
rock bass	1	1	205	205	17.7	8.8	0.3	539	7.8	82	6
sand shiner	9	650	51.2	27 – 70	15.4 – 26.7	7.73 – 10.6	0.4 – 3.3	759 – 6,010	6.44 – 8.74	70.4 - 102	14 – 1,000
shorthead redhorse	3	18	116.1	32 – 288	20.9 – 23.2	7.73 – 9.0	0.4 – 2.1	759 – 3,925	6.44 – 7.67	70.4 – 90.1	14 – 1,000
smallmouth bass	1	2	99.5	75 - 124	23.2	8.6	0.4	759	7.67	90.1	14
stonecat	1	1	85.0	85	20.9	7.73	0.7	1,448	6.44	70.4	1,000
western silvery minnow	5	88	104.2	85 – 140	15.4 – 23.2	7.73 – 9.0	0.4 – 3.3	759 – 6,010	6.44 – 8.14	70.4 - 93	14 – 1,000
white sucker	19	608	117.2	29 – 285	10.3 – 25.5	7.73 – 9.6	0.3 – 3.3	632 – 6,010	3.85 – 10.98	40.6 - 113	3.4 – 1,000
yellow perch	2	40	133.9	79 - 175	22.7 – 22.8	8.75 – 9.0	0.5 – 0.9	1,051 – 1,841	7.46 – 9.89	87.1 – 126.2	14 - 29
Water Quality Ranges in Which Fish Were Observed					10.3 – 31.7	7.37 – 10.6	0.1 – 6.1	275.4 – 10,780	1.85 – 13.55	22.5 – 150.7	3.4 – 1,000

Prairie Stream Surveys 2007 – Region 7

Table 6. Water type and quality measurement data collected during Region 7 prairie stream surveys, May – September 2007.

Site	Date	Water Type				Water Quality Measurements					
		Dry	Flowing	Interrupted Standing Pools	Continuous Standing Water	Temperature (°C)	pH	Conductivity (µS)	Salinity (ppt)	Dissolved Oxygen (%)/(mg/l)	Turbidity (NTU)
10040104 – Fort Peck Reservoir											
Big Dry Creek ¹	6/12/07		X			23.6	8.26	998	0.5	93.2 / 7.88	200
Snap Creek ²	6/12/07		X			20.3	7.57	544	0.3	82.6 / 7.47	26
10040106 – Little Dry											
Lone Tree Creek ^{1,2}	8/2/07			X		25.8	8.37	2,301	1.2	102 / 8.25	55
10040202 – Middle Musselshell											
Antelope Creek	7/9/07	X									
Big Breed Creek ^{1,2}	7/9/07			X		22.8	8.75	1,841	0.9	87.1 / 7.46	14
Orchard Coulee ^{1,3}	7/11/07		X			24.4	8.7	1,174	0.6	149.6 / 11.29	7.8
10040205 – Lower Musselshell											
Bair Coulee	7/11/07	X									
Dead Horse Creek	7/10/07	X									
Hensleigh Coulee	7/11/07	X									
Seventynine Coulee	7/10/07	X									
Skeleton Creek ²	7/11/07				X	21.7	8.37	507	0.2	97.4 / 8.34	290
Tuccori Coulee	7/11/07	X									
10080015 – Lower Bighorn											
Thunder Creek	7/12/07			X		20.3	8.98	5,760	3.1	49.7 / 4.36	19
10090101 – Upper Tongue											
Deer Creek ⁴	5/10/07		X			12.8	8.94	5,530	4.0	47.9 / 4.97	2.9
Deer Creek ⁴	8/22/07	X									
Hanging Woman Creek ^{1,2,3,4}	5/10/07		X			20.3	8.43	1,721	0.9	70.2 / 6.32	39
Hanging Woman Creek ^{1,2,4}	9/4/07		X			19.1	9.1	2,585	1.3	69.9 / 6.43	5.88

¹ Fish Present

² Amphibians Present

³ Reptiles Present

⁴ CBM Repeat Site

Prairie Stream Surveys 2007 – Region 7

Table 6 – continued.

Table 3 – continued.											
		Water Type				Water Quality Measurements					
Site	Date	Dry	Flowing	Interrupted Standing Pools	Continuous Standing Water	Temperature (°C)	pH	Conductivity (µS)	Salinity (ppt)	Dissolved Oxygen (%)/(mg/l)	Turbidity (NTU)
10090101 – Upper Tongue (continued)											
Waddle Creek ^{2,4}	5/10/07		X			21.0	10.48	4,132	2.2	214.2 / 18.31	4.3
Waddle Creek ⁴	8/22/07	X									
Youngs Creek ^{1,3,4}	5/9/07		X			19.5	8.83	632	0.3	77.1 / 7.07	18
Youngs Creek ^{1,2,4}	8/20/07		X			14.8	9.6	665	0.3	91.0 / 9.2	33
10090102 – Lower Tongue											
Ash Creek _{1,2}	6/13/07		X			18.9	7.54	898	0.4	74.8 / 7.02	80
Bales Creek	7/17/07	X									
Billup Creek	7/17/07	X									
Brian Creek	7/16/07	X									
Crazy Head Fork _{1,2}	8/10/07		X			17.7	8.8	539	0.3	82 / 7.8	6
Dry Creek	7/16/07	X									
East Fork Otter Creek	7/17/07	X									
King Creek ²	7/16/07			X		30.0	9.23	3,756	2.0	108 / 7.96	10
Little Bear Creek	7/17/07	X									
Logging Creek site #1 ^{1,2,3}	8/10/07		X			20.6	9.3	801	0.4	150.7 / 13.55	6.52
Logging Creek site #2 ^{1,2,3}	8/10/07		X			22.0	9.4	1,085	0.5	111.5 / 9.81	3.89
North Fork Taylor Creek ¹	7/17/07		X			17.7	---	3,020	1.6	113 / 10.98	3.6
Paget Creek ²	7/16/07		X			26.7	9.03	2,060	1.1	208.6 / 16.6	9.9

¹ Fish Present

² Amphibians Present

³ Reptiles Present

⁴ CBM Repeat Site

Prairie Stream Surveys 2007 – Region 7

Table 6 – continued.

Table 3 continued.											
		Water Type				Water Quality Measurements					
				Interrupted Standing Pools	Continuous Standing Water	Temperature (°C)	pH	Conductivity (µS)	Salinity (ppt)	Dissolved Oxygen (%)/(mg/l)	Turbidity (NTU)
Site	Date	Dry	Flowing								
10090102 – Lower Tongue (continued)											
Pumpkin Creek ^{1,2,3,4}	5/16/07		X			15.4	8.95	3,570	1.9	82 / 8.14	80
Pumpkin Creek ^{1,2,3,4}	8/13/07			X		22.3	9.0	6,010	3.3	93 / 7.76	49
Taylor Creek ^{1,2}	7/17/07			X		14.1	---	2,403	1.2	82 / 7.98	4.7
White Horse Spring ²	8/10/07		X			16.0	8.7	416	0.2	70 / 6.88	750
Wooden Thigh Creek site #1	8/10/07		X			18.6	9.3	356	0.2	112.8 / 10.52	9.14
Wooden Thigh Creek site #2 ^{1,2}	8/10/07		X			31.7	10.0	641	0.3	120.5 / 8.89	7.85
10090207 – Middle Powder											
Bloom Creek	7/18/07	X									
Dry Creek	7/18/07	X									
10090208 – Little Powder											
Little Powder River ^{1,3,4}	6/6/07		X			20.9	7.73	1,448	0.7	70.4 / 6.44	1,000
Little Powder River ^{1,2,4}	8/14/07		X			22.4	9.0	3,925	2.1	84.8 / 7.26	20
Scott Creek ²	6/19/07			X		19.8	7.19	1,153	0.6	15.9 / 1.53	19
10090209 – Lower Powder											
Archdale Creek ²	7/30/07			X		19.8	8.12	3,758	2.0	95.4 / 8.76	32
Cox Creek	7/30/07	X									
Long Prong Locate Creek	7/30/07	X									
Spring Creek ^{1,2,3,4}	6/11/07		X			26.7	8.04	1,042	0.5	98.8 / 7.7	19
Spring Creek ^{1,2,3,4}	8/15/07			X		19.8	10.6	2,640	1.4	96.3 / 8.74	59.6
10090210 - Mizpah											
Ash Creek ³	6/6/07	X									
Big Bobcat Creek ²	7/18/07			X		27.7	9.18	2,753	1.4	110.6 / 8.76	26

¹ Fish Present

² Amphibians Present

³ Reptiles Present

⁴ CBM Repeat Site

Prairie Stream Surveys 2007 – Region 7

Table 6 – continued.

Table 6 continued.											
		Water Type				Water Quality Measurements					
Site	Date	Dry	Flowing	Interrupted Standing Pools	Continuous Standing Water	Temperature (°C)	pH	Conductivity (µS)	Salinity (ppt)	Dissolved Oxygen (%)/(mg/l)	Turbidity (NTU)
10090210 – Mizpah (continued)											
Dick Creek ^{2,3}	7/18/07			X		27.6	9.04	2,815	1.4	106.7 / 8.38	8.2
Hudson Creek	7/18/07	X									
Lake Creek	7/18/07	X									
Mud Spring Creek	7/18/07	X									
10100001 – Lower Yellowstone-Sunday											
Bone Coulee	6/14/07	X									
Caprock Coulee	7/31/07	X									
Cottowood Creek ^{1,2,3}	8/7/07		X			23.2	8.6	759	0.4	90.1 / 7.67	14
Cox Coulee	7/12/07	X									
Donley Creek	7/12/07	X									
Geyser Spring Coulee	6/14/07	X									
Horse Creek	7/12/07	X									
McGraw Coulee ³	6/14/07		X			20.4	7.99	2,734	1.4	71.9 / 6.52	28
Rainwater Coulee	7/12/07	X									
Sarpy Creek ^{1,2,4}	6/4/07		X			22.8	7.71	4,440	0.2	86 / 7.52	5.1
Sarpy Creek ^{1,2,3,4}	9/6/07			X		20.6	9.5	5,400	2.9	55.2 / 4.85	13.7
Slaughterhouse Creek	6/14/07	X									
West Muggins Creek	6/14/07	X									
10100002 – Big Porcupine											
East Blacktail Creek ²	6/14/07			X		20.5	7.74	2,153	0.8	86.4 / 7.61	12
Living Ash Creek	6/14/07	X									
Sun Coulee	6/14/07	X									

¹ Fish Present

² Amphibians Present

³ Reptiles Present

⁴ CBM Repeat Site

Prairie Stream Surveys 2007 – Region 7

Table 6 – continued.

Table 3 - Continued.											
Water Type						Water Quality Measurements					
Site	Date	Dry	Flowing	Interrupted Standing Pools	Continuous Standing Water	Temperature (°C)	pH	Conductivity (µS)	Salinity (ppt)	Dissolved Oxygen (%)/(mg/l)	Turbidity (NTU)
10100003 - Rosebud											
Alderson Creek ¹	8/9/07		X			18.5	9.2	823	0.4	116 / 10.64	13
East Fork Muddy Creek ^{1,2}	8/9/07		X			12.8	8.5	1,570	0.8	110.1 / 11.58	3.6
Lame Deer Creek ^{1,2}	8/9/07		X			20.5	8.7	1,406	0.7	22.5 / 2.01	17
Muddy Creek ^{1,2}	8/9/07		X			13.2	8.4	2,038	1.0	72.2 / 7.38	6.1
Rosebud Creek site #1 ^{1,4}	5/8/07		X			10.3	8.78	753	0.4	64.7 / 7.18	9.9
Rosebud Creek site #1 ^{1,2,4}	8/21/07		X			15.3	9.2	2,071	1.1	40.6 / 4.05	18.8
Rosebud Creek site #2 ^{1,2,4}	5/8/07		X			14.7	8.78	784	0.4	88.7 / 9.01	3.7
Rosebud Creek site #2 ^{1,2,3,4}	8/21/07			X		18.4	9.2	1,175	0.6	47.6 / 4.6	5.74
Rosebud Creek site #3 ^{1,2,3,4}	5/9/07		X			13.1	8.62	787	0.4	61.6 / 6.5	3.4
Rosebud Creek site #3 ^{1,2,4}	8/21/07		X			20.7	9.3	1,262	0.6	43.7 / 3.85	9.97
10100004 – Lower Yellowstone											
Cigar Creek	7/31/07	X									
Coal Creek ²	5/17/07			X		20.3	8.31	586	0.3	21.1 / 1.96	Out of Range
Crane Creek	6/5/07	X									
Hay Creek	7/31/07	X									
Hodges Creek ²	7/31/07	X									
O’Brien Creek ^{1,2,3}	6/5/07				X	23.0	7.37	1,608	0.8	46.4 / 4.0	7.6
Plenty Creek ²	7/31/07			X		23.9	7.96	1,431	0.7	60 / 5.22	250

¹ Fish Present

² Amphibians Present

³ Reptiles Present

⁴ CBM Repeat Site

Prairie Stream Surveys 2007 – Region 7

Table 6 – continued.

Table 3 - Continued.											
Site	Date	Water Type				Water Quality Measurements					
		Dry	Flowing	Interrupted Standing Pools	Continuous Standing Water	Temperature (°C)	pH	Conductivity (µS)	Salinity (ppt)	Dissolved Oxygen (%)/(mg/l)	Turbidity (NTU)
10100004 – Lower Yellowstone (continued)											
Robertson Creek	7/31/07	X									
Stouts Creek	7/31/07	X									
War Dance Creek	6/5/07	X									
Whoopup Creek	7/31/07	X									
10100005 – O’Fallon											
Alkali Creek ^{1,2,3}	6/28/07			X		25.5	9.57	1,482	0.8	79.5 / 6.75	7.7
Dry Creek	7/30/07	X									
Lone Tree Creek	6/28/07	X									
10110201 – Upper Little Missouri											
Blacktail Creek ²	6/26/07			X		25.1	9.33	2,078	1.1	139.7 / 11.18	8.3
Flasted Draw	6/21/07	X									
Hackberry Creek ^{1,2}	6/26/07			X		20.7	8.9	984	0.5	88.5 / 7.84	8.9
North Thompson Creek ^{1,2}	6/18/07		X			18.8	7.97	1,344	0.7	68.2 / 6.37	13
Sand Creek ²	6/26/07			X		18.5	9.64	1,278	0.6	107.2 / 10.2	130
10110202 - Boxelder											
Big Ramme Creek ²	6/27/07			X		16.2	7.66	186.3	0.1	69.8 / 6.95	22
Coal Creek ^{1,2,3}	6/21/07		X			21.6	8.6	1,854	0.9	26 / 1.85	39
Corral Creek ^{1,2}	6/21/07		X			17.4	7.81	2,949	0.1	61.4 / 5.91	246
Corral Creek ^{1,2}	6/25/07		X			26.2	8.18	495	0.2	80 / 6.37	38
Fresh Water Draw	6/27/07	X									

¹ Fish Present

² Amphibians Present

³ Reptiles Present

⁴ CBM Repeat Site

Prairie Stream Surveys 2007 – Region 7

Table 6 – continued.

Site	Date	Water Type				Water Quality Measurements					
		Dry	Flowing	Interrupted Standing Pools	Continuous Standing Water	Temperature (°C)	pH	Conductivity (µS)	Salinity (ppt)	Dissolved Oxygen (%)/(mg/l)	Turbidity (NTU)
Lone Tree Creek ^{1,2}	6/27/07		X			26.4	7.58	298.8	0.1	93.3 / 8.0	270
McCarty Creek ^{1,2,3}	6/20/07			X		22.7	9.0	1,051	0.5	126.2 / 9.89	29
West Fork Boxelder Creek	6/19/07	X									
Whitetail Creek ^{1,2}	6/19/07				X	23.2	7.8	702	0.3	57.7 / 5.11	80
10110204 - Beaver											
Yates Creek ^{1,2}	8/1/07			X		28.5	7.94	10,780	6.1	78.5 / 5.87	50

¹ Fish Present

² Amphibians Present

³ Reptiles Present

⁴ CBM Repeat Site

Prairie Stream Surveys 2007 – Region 7

Table 7. Stream morphology and substrate composition of Region 7 prairie streams sampled, May – September 2007.

Site	Date	% Wetted Reach in Sample	Mean			Percent Substrate* Composition									
			Wetted Width (m)	Thalweg Depth (cm)	Transect Depth (cm)	BR	BL	CB	CG	FG	SA	FN	HP	WD	OT
10040104 – Fort Peck Reservoir															
Big Dry Creek ¹	6/12/07	100	14.44	41.71	20.38			0.6	32.9	27.7	8.4	30.3			
Snap Creek ²	6/12/07	100	1.24	19.03	11.36		1.3	5.8	10.3	47.7	18.1	16.1			0.6
10040106 – Little Dry															
Lone Tree Creek ^{1,2}	8/2/07	89	2.47	46.46	21.76				3.9	54.8	1.9	38.1	1.3		
10040202 – Middle Musselshell															
Orchard Coulee ^{1,3}	7/11/07	100	3.25	65.77	41.76					3.2	4.5	21.3	64.5		6.5
10040205 – Lower Musselshell															
Skeleton Creek ²	7/11/07	96.13	4.15	32.48	18.35							100			
10090101 – Upper Tongue															
Deer Creek ⁴	5/10/07	99.4	2.97	14.41	10.55					4.5	31.6	14.2			49.7
Hanging Woman Creek ^{1,2,3,4}	5/10/07	100	5.28	53.40	40.85			4.5	16.1	27.7	10.3	34.2			7.1
Hanging Woman Creek ^{1,2,4}	9/4/07	100	4.64	31.79	20.82			14.8	20	20	5.8	35.5		0.6	3.2
Waddle Creek ^{2,4}	5/10/07	100	12.49	33.08	19.38							100			
Youngs Creek ^{1,3,4}	5/9/07	100	3.65	59.16	29.49			0.6		4.5	12.9	60		9	12.9
Youngs Creek ^{1,2,4}	8/20/07	100	1.45	23.33	12.53			1.3	0.6	9	0.6	65.2	1.9	21.3	
10090102 – Lower Tongue															
Ash Creek ^{1,2}	6/13/07	100	1.27	44.38	29.44						23.2	76.1		0.6	
King Creek ²	7/16/07	60.0	0.57	4.32	4.27		1.1	14	20.4	12.9	43	1.1			7.5

* BR=Bedrock; BL=Boulder; CB=Cobble; CG=Course Gravel; FG=Fine Gravel; SA=Sand; FN=Fines; HP=Hardpan; WD=Woody Debris; OT=Other (grass, etc.)

¹ Fish Present

² Amphibians Present

³ Reptiles Present

⁴ CBM Repeat Site

Prairie Stream Surveys 2007 – Region 7

Table 7 – continued.

Table 7. Continued.															
Site	Date	% Wetted Reach in Sample	Mean			Percent Substrate* Composition									
			Wetted Width (m)	Thalweg Depth (cm)	Transect Depth (cm)	BR	BL	CB	CG	FG	SA	FN	HP	WD	OT
10090102 – Lower Tongue (continued)															
North Fork Taylor Creek ¹	7/17/07	100	1.20	13.13	5.87			1.3	0.6		70.3	11.6		12.3	3.9
Paget Creek ²	7/16/07	100	2.10	13.39	7.73		3.2	31	16.8	24.5	12.9	0.6			11
Pumpkin Creek ^{1,2,3,4}	5/16/07	100	2.95	77.37	44.93			0.6		1.9	2.6	88.4			6.5
Pumpkin Creek ^{1,2,3,4}	8/13/07	59.35	1.14	17.08	12.25		0.6					99.4			
Taylor Creek ^{1,2}	7/17/07	12.26	0.16	0.63	0.27						52.6				47.4
10090208 – Little Powder															
Little Powder River ^{1,2,4}	8/14/07	100	5.97	60.53	37.16			4.5	22.6	41.3	7.1	18.7	4.5	1.3	
10090209 – Lower Powder															
Spring Creek ^{1,2,3,4}	6/11/07	100	2.24	62.01	40.51						42.6	52.9			4.5
Spring Creek ^{1,2,3,4}	8/15/07	52.9	0.55	4.81	4.20						12.9	87.1			
10100001 – Lower Yellowstone-Sunday															
Cottowood Creek ^{1,2,3}	8/7/07	100	5.43	35.04	20.49			1.8	44.5	47.3	0.9	4.5			0.9
McGraw Coulee ³	6/14/07	100	1.30	6.00	5.00							95			5
Sarpy Creek ^{1,2,4}	6/4/07	100	6.32	24.36	15.93					5.2	21.3	45.2		1.9	26.5
Sarpy Creek ^{1,2,3,4}	9/6/07	27.74	2.25	15.80	8.56							100			

* BR=Bedrock; BL=Boulder; CB=Cobble; CG=Course Gravel; FG=Fine Gravel; SA=Sand; FN=Fines; HP=Hardpan; WD=Woody Debris; OT=Other (grass, etc.)

* BR=Bedrock; BL=Boulder; CB=Cobble; CG=Course Gravel; FG=Fine Gravel; SA=Sand; FN=Fines; HP=Hardpan; WD=Woody Debris; OT=Other (grass, etc.)

¹ Fish Present

² Amphibians Present

³ Reptiles Present

⁴ CBM Repeat Site

Prairie Stream Surveys 2007 – Region 7

Table 7 – continued.

Site	Date	% Wetted Reach in Sample	Mean			Percent Substrate* Composition									
			Wetted Width (m)	Thalweg Depth (cm)	Transect Depth (cm)	BR	BL	CB	CG	FG	SA	FN	HP	WD	OT
10100003 - Rosebud															
Rosebud Creek site #1 ^{1,4}	5/8/07	100	7.34	87.78	43.24		0.6	0.6		2.6	41.3	29	1.9	9.7	14.2
Rosebud Creek site #1 ^{1,2,4}	8/21/07	97.42	1.70	19.78	11.11			6.5	7.7	3.9	9.7	33.5	7.7	26.5	4.5
Rosebud Creek site #2 ^{1,2,4}	5/8/07	100	18.57	94.83	33.89			1.3		2.6	10.3	27.1	0.6	5.2	52.9
Rosebud Creek site #2 ^{1,2,3,4}	8/21/07	90.32	2.06	19.68	12.71			0.7			17	56.7		7.1	18.4
Rosebud Creek site #3 ^{1,2,3,4}	5/9/07	100	3.85	87.07	48.33			1.9	1.3	21.3	27.7	27.7	3.2	1.9	14.8
Rosebud Creek site #3 ^{1,2,4}	8/21/07	98.71	1.64	28.25	16.36			1.9	5.2	16.1	11	49	8.4	6.5	1.9
10100004 – Lower Yellowstone															
Coal Creek ²	5/17/07	71.6	0.94	12.93	6.67			0.6	39.4	19.4	16.8	23.2			0.6
O’Brien Creek ^{1,2,3}	6/5/07	69.67	7.15	28.29	16.58			0.9	3.6	0.9	15.5	72.7		1.8	4.5
10100005 – O’Fallon															
Alkali Creek ^{1,2,3}	6/28/07	42.58	0.65	7.77	4.73			1.5				90.9			7.6
10110201 – Upper Little Missouri															
Hackberry Creek ^{1,2}	6/26/07	60.65	1.81	17.82	8.04							91.6		8.4	
North Thompson Creek ^{1,2}	6/18/07	100	3.72	49.83	36.60				1.3	11.6	34.8	50.3	1.9		
Sand Creek ²	6/26/07	54.84	0.45	6.06	4.42						100				

* BR=Bedrock; BL=Boulder; CB=Cobble; CG=Course Gravel; FG=Fine Gravel; SA=Sand; FN=Fines; HP=Hardpan; WD=Woody Debris; OT=Other (grass, etc.)

* BR=Bedrock; BL=Boulder; CB=Cobble; CG=Course Gravel; FG=Fine Gravel; SA=Sand; FN=Fines; HP=Hardpan; WD=Woody Debris; OT=Other (grass, etc.)

¹ Fish Present

² Amphibians Present

³ Reptiles Present

⁴ CBM Repeat Site

Prairie Stream Surveys 2007 – Region 7

Table 7 – continued.

Site	Date	% Wetted Reach in Sample	Mean			Percent Substrate* Composition									
			Wetted Width (m)	Thalweg Depth (cm)	Transect Depth (cm)	BR	BL	CB	CG	FG	SA	FN	HP	WD	OT
10110202 - Boxelder															
Coal Creek ^{1,2,3}	6/21/07	100	3.24	33.25	20.04				2.6		28.4	61.3			7.7
Corral Creek ^{1,2}	6/21/07	100	2.75	73.04	40.04		1.3	0.6	5.8	21.3	31.6	8.4	17.4		13.5
Corral Creek ^{1,2}	6/25/07	72.90	1.60	25.89	10.85				0.9	0.9	11.6	50	11.6	11.6	13.4
Lone Tree Creek ^{1,2}	6/27/07	100	1.54	25.29	13.07							94.8			5.2
McCarty Creek ^{1,2,3}	6/20/07	10.30	0.66	4.89	5.65						12.5	50	37.5		
Whitetail Creek ^{1,2}	6/19/07	100	5.16	73.09	34.25						5.8	44.5	39.4	10.3	
10110204 - Beaver															
Yates Creek ^{1,2}	8/1/07	67.77	4.93	15.98	11.60							100			

* BR=Bedrock; BL=Boulder; CB=Cobble; CG=Course Gravel; FG=Fine Gravel; SA=Sand; FN=Fines; HP=Hardpan; WD=Woody Debris; OT=Other (grass, etc.)

¹ Fish Present

² Amphibians Present

³ Reptiles Present

⁴ CBM Repeat Site

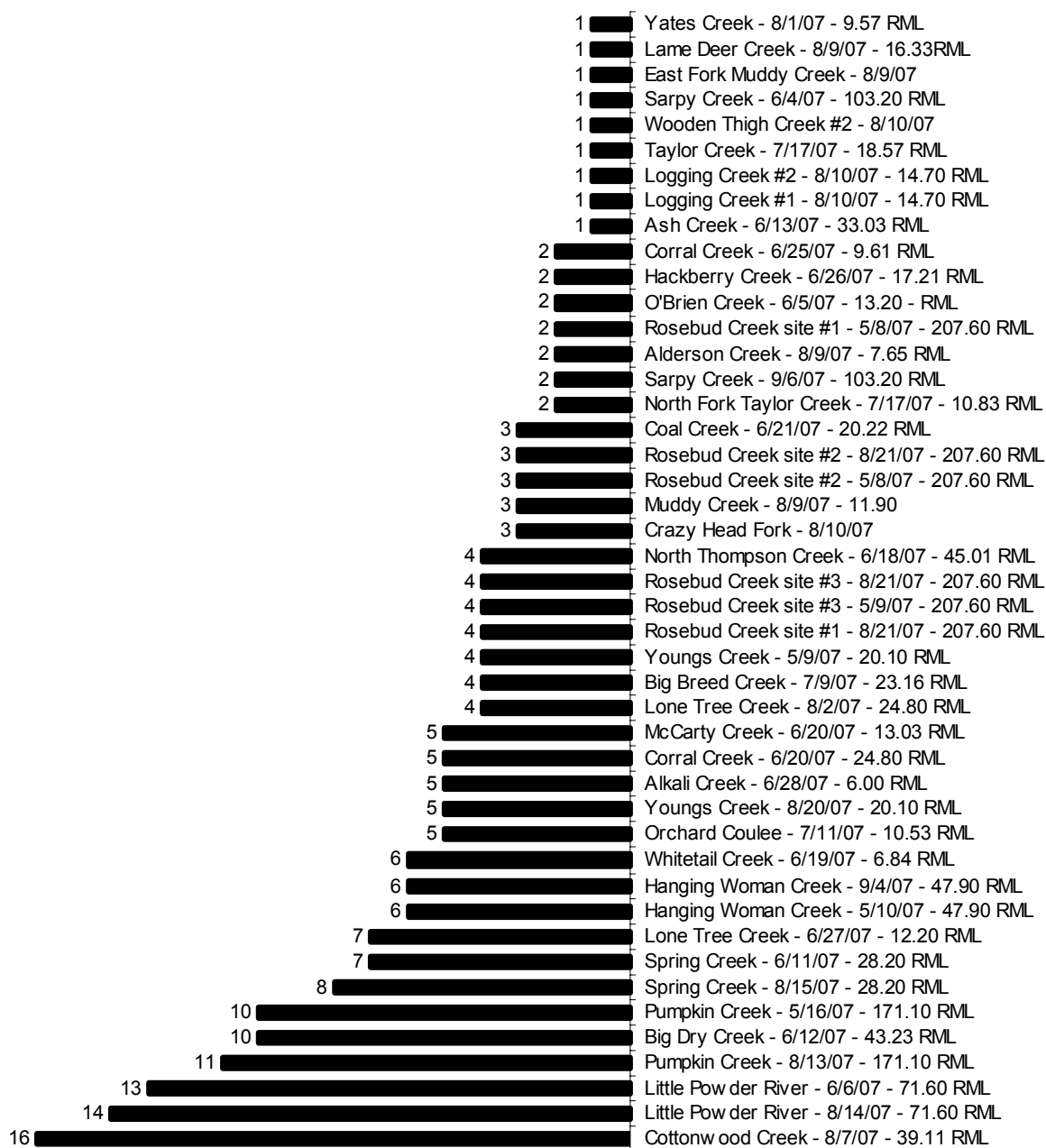


Figure 4. Number of fish species observed at Region 7 prairie stream sites with date sampled and total stream length (miles), May – September 2007.

Coal Bed Methane Repeat Sites

10090101 - Upper Tongue River

Deer Creek was sampled on May 5 (spring) and August 22 (summer), 2007. Deer Creek was flowing in the spring, but was dry in the summer survey (Table 6). No fish or herpetofauna was observed during either survey. Fish have not been observed in Deer Creek since MFWP started sampling this site in 2003.

Hanging Woman Creek was sampled on May 10 (spring) and September 4 (summer), 2007. Water was flowing during both spring and summer surveys (Table 6). Six species of fish were observed during both the spring and summer surveys that included black bullheads, brassy minnows, common carp, fathead minnows, green sunfish, and white suckers (Table 2, Figure 5). Painted turtles (*Chrysemys picta*) were observed during the spring survey and northern leopard frogs were sighted during both spring and summer surveys (Table 4).

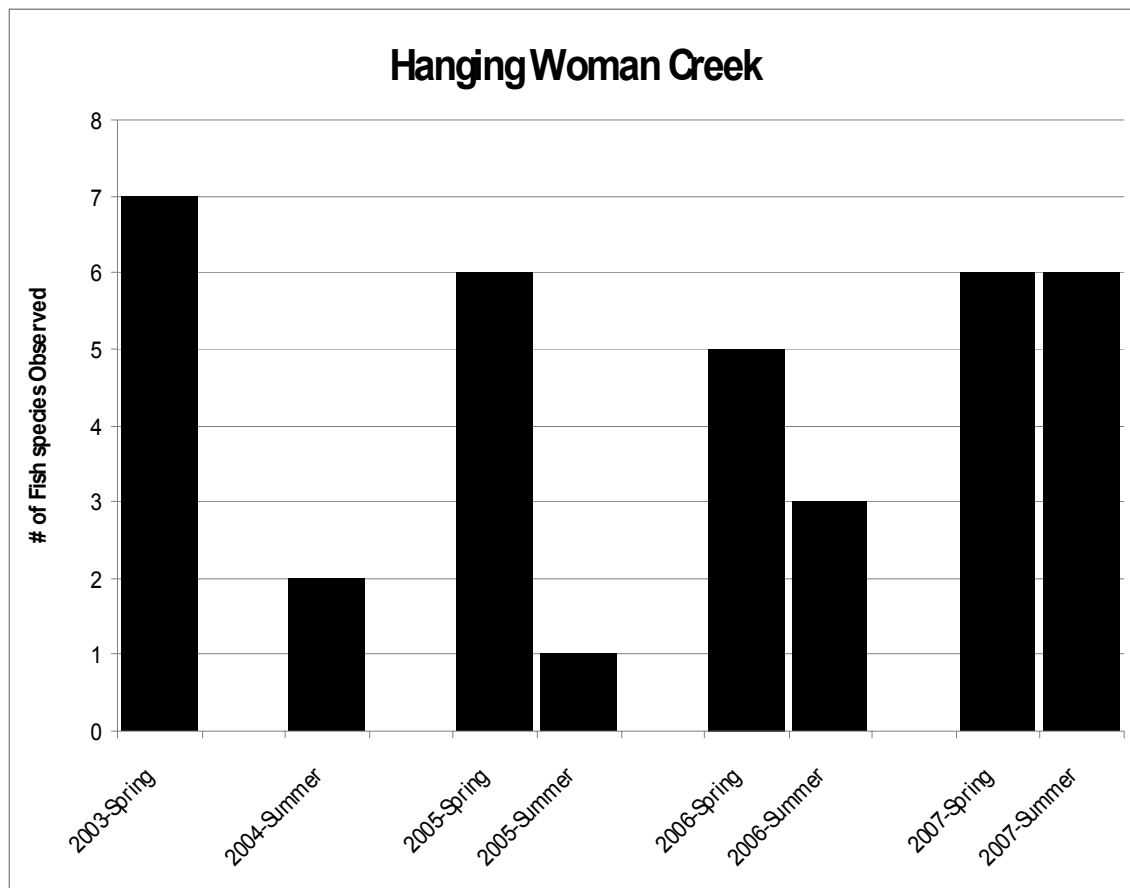


Figure 5. Number of fish species observed at the Hanging Woman Creek CBM repeat site by year and season, 2003-2007.

Waddle Creek was sampled on May 10 (spring) and August 22 (summer), 2007. This site was flowing during the spring survey and dry during the summer survey (Table 6). A boreal chorus frog and 20 northern leopard frog larvae were observed during the spring survey (Table 4). Fish have not been observed in Waddle Creek since MFWP started sampling this site in 2003.

Youngs Creek was sampled on May 9 (spring) and August 20 (summer), 2007. Water was flowing during both surveys (Table 6). Four species of fish were observed during the spring survey that included creek chubs (*Semotilus atromaculatus*), fathead minnows, longnose dace, and white suckers (Table 2). The prior four fish species were captured during the summer survey in addition to brassy minnows (Table 2), for a total of five species as seen in Figure 6. A terrestrial garter snake (*Thamnophis elegans*) was observed during the spring survey and over 75 northern leopard frogs were seen during the summer survey (Table 4).

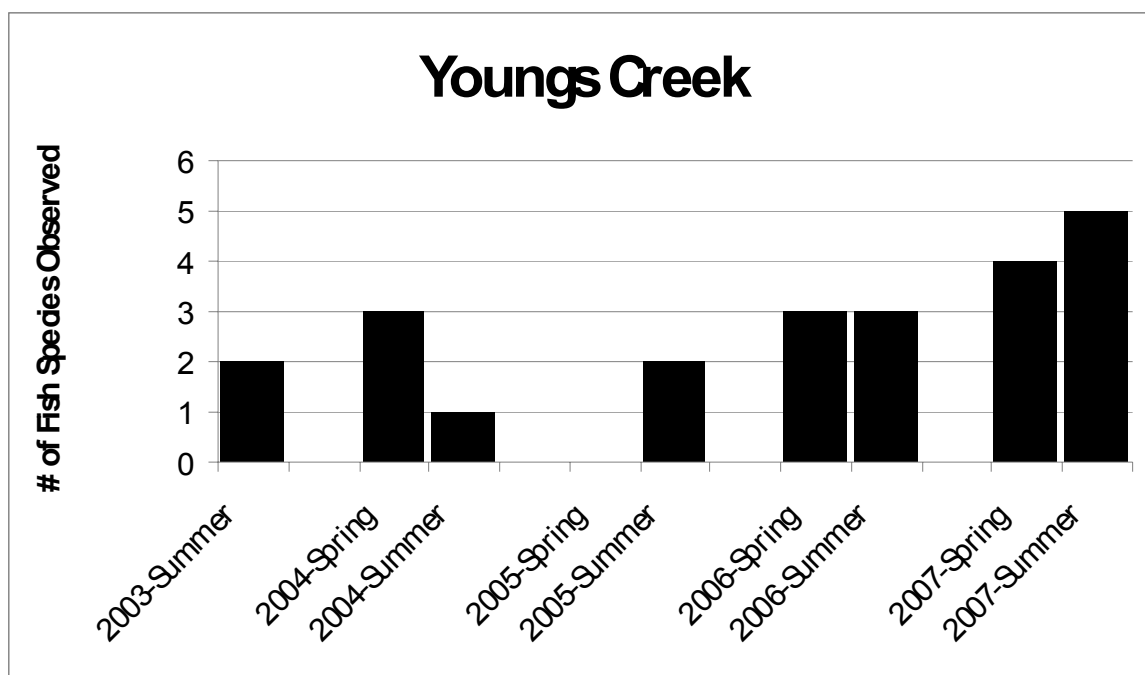


Figure 6. Number of fish species observed at the Youngs Creek CBM repeat site by year and season, 2003-2007.

10090102 - Lower Tongue River

Pumpkin Creek was sampled on May 16 (spring) and August 13 (summer), 2007. Water was flowing during the spring survey and consisted of interrupted standing pools of water during the summer survey (Table 6). Ten species of fish were observed during the spring survey, including: brassy minnows, a channel catfish (*Ictalurus punctatus*), a common carp, fathead minnows, a flathead chub (*Platygobio gracilis*), goldeye (*Hiodon alosoides*), green sunfish, plains minnows (*Hybognathus placitus*), sand shiners (*Notropis stramineus*), and western silvery minnows (*Hybognathus argyritis*) (Table 2). Eleven

species of fish were captured during the summer survey (Figure 7), including a young-of-the-year bigmouth buffalo (*Ictiobus cyprinellus*), channel catfish, common carp, fathead minnows, green sunfish, lake chubs, plains minnows, river carpsuckers (*Carpiodes carpio*), sand shiners, western silvery minnows, and white suckers (Table 2). The presence of several “large river” species was likely due to stream flows that reached over 700 cubic feet per second (cfs) in early May and attained 550+ cfs in June. These increased pulses of water almost certainly triggered many of these species to migrate from the Tongue River upstream into Pumpkin Creek to spawn. A common garter snake (*Thamnophis sirtalis*) and two woodhouse’s toads were observed during spring sampling, and northern leopard frogs, painted turtles, and a woodhouse’s toad were seen during the summer survey (Table 4).

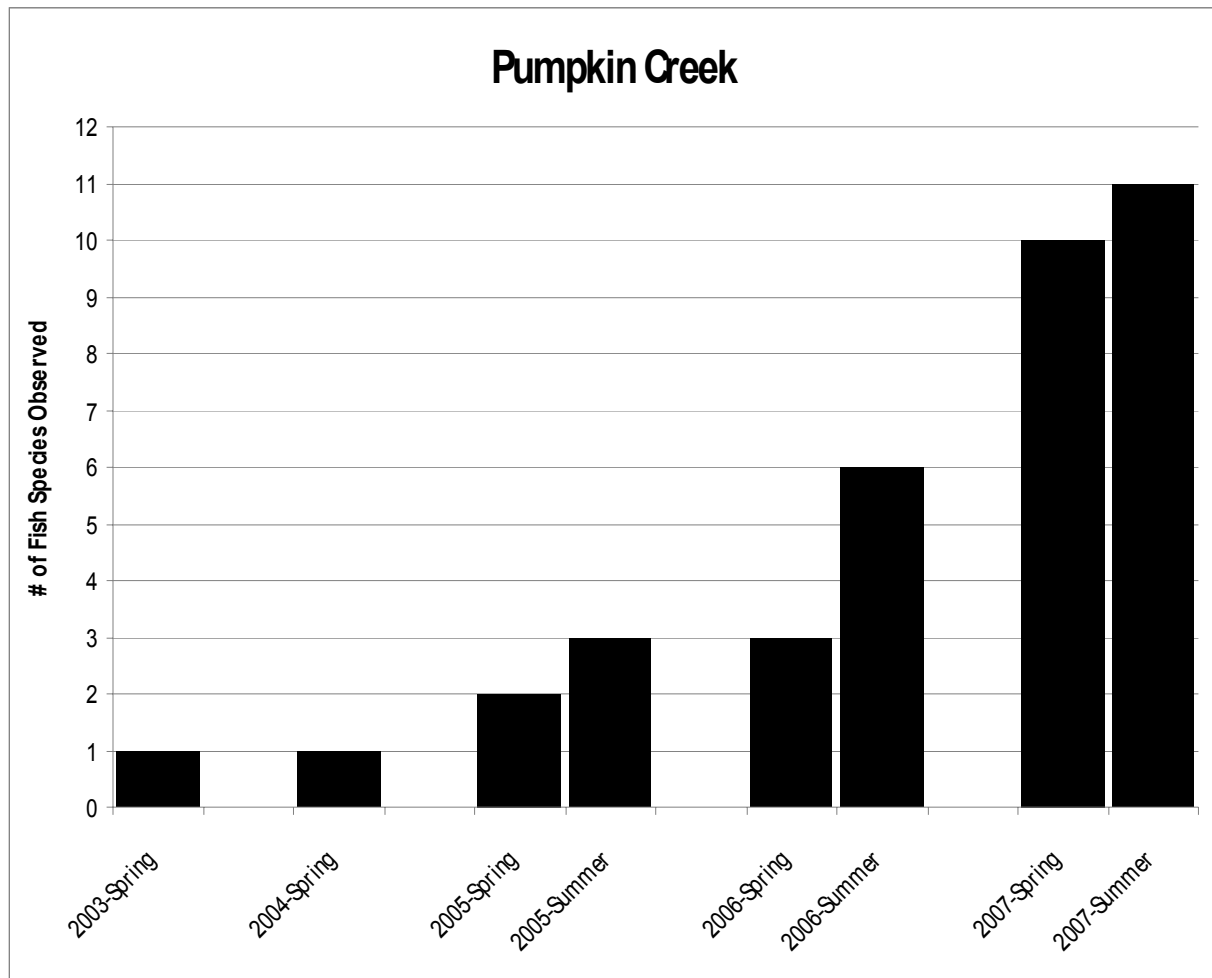


Figure 7. Number of fish species observed at the Pumpkin Creek CBM repeat site by year and season, 2003-2007.

10090208 – Little Powder

Little Powder River was sampled on June 6 (spring) and August 14 (summer), 2007. Water was flowing during both the spring and summer surveys (Table 6). Thirteen species of fish were captured during the spring survey and 14 species were caught in the summer survey (Figure 8). Combined spring and summer surveys yielded 15 species of fish which included black bullheads, channel catfish, common carp, fathead minnows, flathead chubs, goldeye, green sunfish, longnose dace, plains minnows, river carpsuckers, sand shiners, shorthead redhorse (*Moxostoma macrolepidotum*), a stonecat (*Noturus flavus*), western silvery minnows, and white suckers. A snapping turtle (*Chelydra serpentina*) was observed in the spring and a northern leopard frog and woodhouse's toad were witnessed during the summer survey (Table 4).

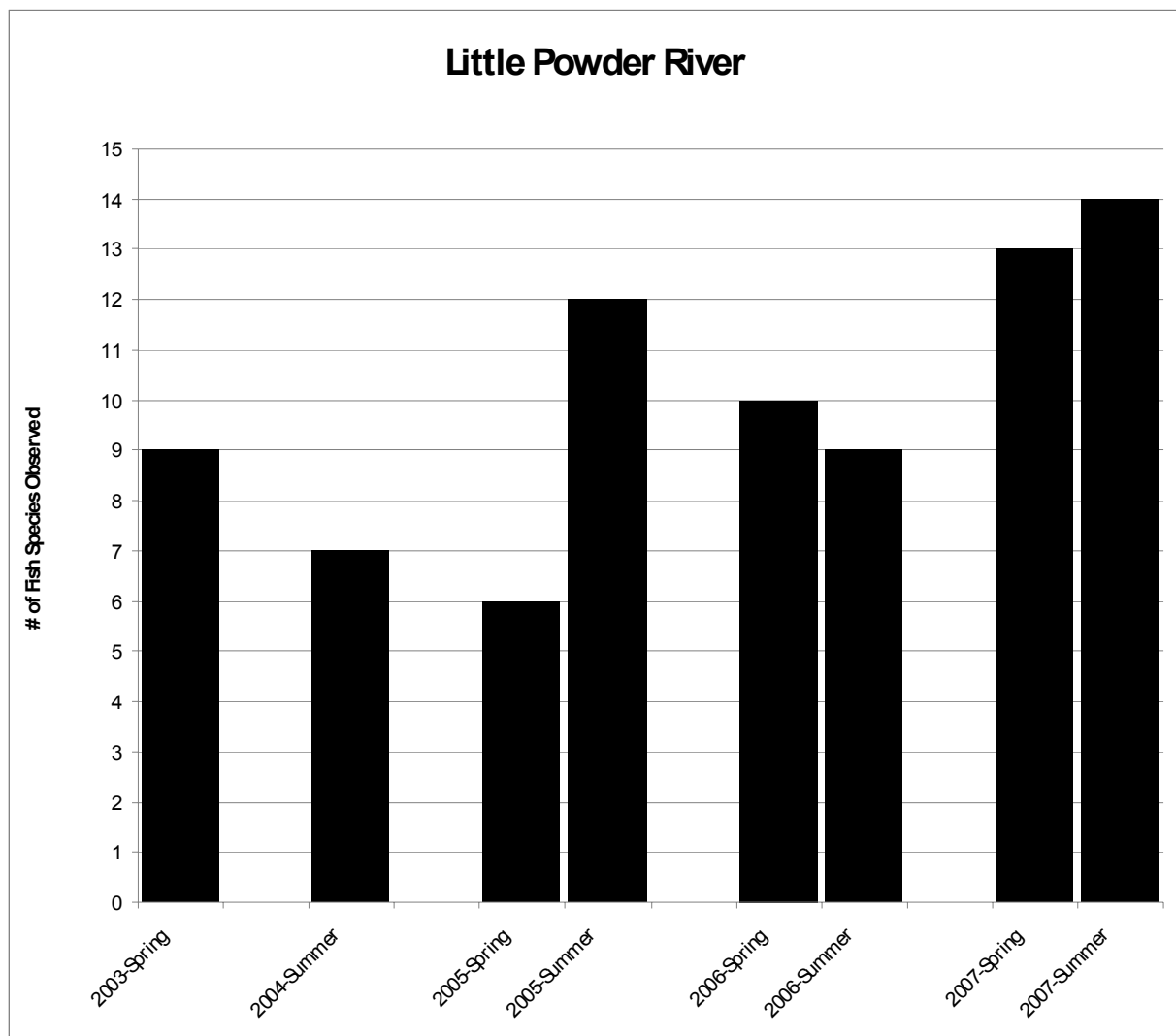


Figure 8. Number of fish species observed at the Little Powder River CBM repeat site by year and season, 2003-2007.

10090209 – Lower Powder

Spring Creek was sampled on June 11 (spring) and August 15 (summer), 2007. Water in Spring Creek was flowing during the spring and it consisted of interrupted standing pools during the summer survey (Table 6). Seven species of fish were captured in the spring and eight species in summer survey (Figure 9). Fish species observed included black bullheads, common carp, creek chubs, fathead minnows, green sunfish, plains killifish (*Fundulus zebrinus*), plains minnows, and sand shiners (Table 2). A northern leopard frog, plains garter snake and woodhouse's toads were observed in the spring, and northern leopard frogs, plains garter snakes and a juvenile snapping turtle were seen in the summer survey (Table 4).

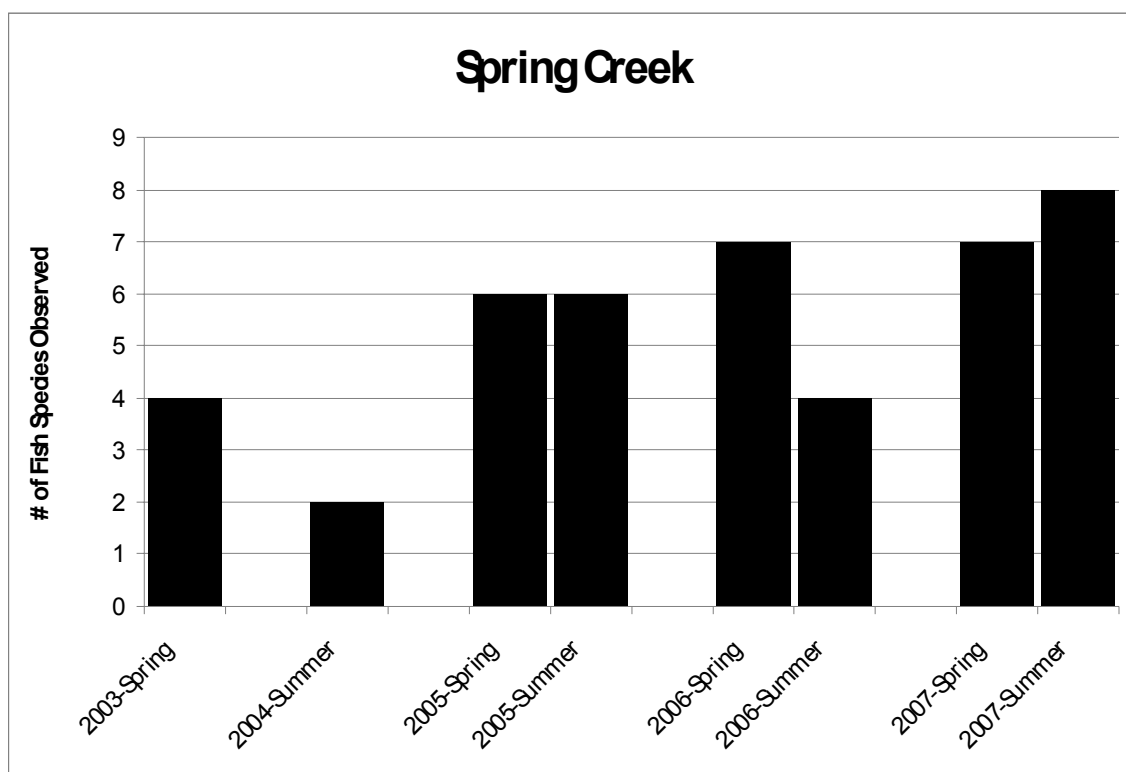


Figure 9. Number of fish species observed at the Spring Creek CBM repeat site by year and season, 2003-2007.

10100001 – Lower Yellowstone-Sunday

Sarpy Creek was sampled on June 4 (spring) and September 6 (summer), 2007. Sarpy Creek was flowing in the spring and contained interrupted standing pools of water during the summer survey (Table 6). Three fathead minnows were the only fish observed in the spring survey (Table 2). The summer survey resulted in the capture of 1,596 green sunfish and 34 fathead minnows (Table 2). Green sunfish had not been captured here in any of the prior MFWP prairie stream sampling efforts since 2003, but Clancey (1976) observed them along with only lake chubs near this location in the fall of 1975. Northern

leopard frog, tiger salamander and woodhouse's toad larvae were all captured in the spring, while northern leopard frogs, a painted turtle and a snapping turtle were observed during the summer survey (Table 4).

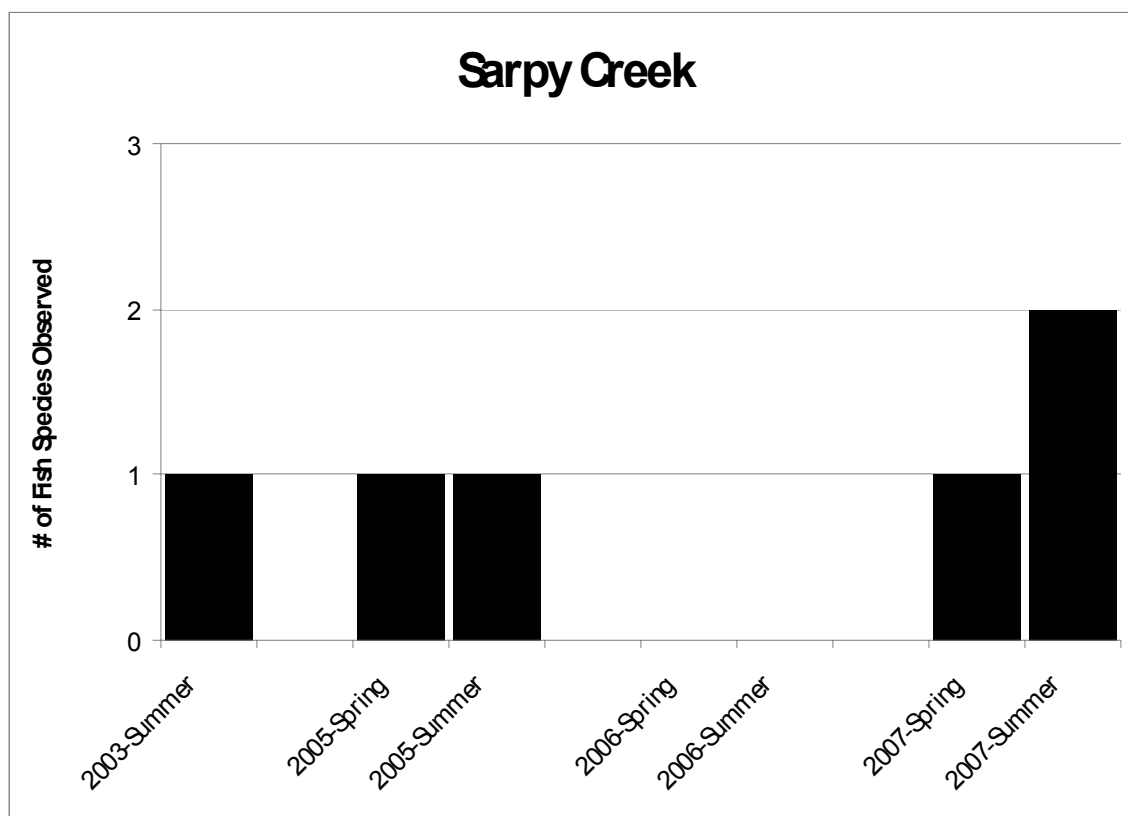


Figure 10. Number of fish species observed at the Sarpy Creek CBM repeat site by year and season, 2003-2007.

10100003 – Rosebud

Rosebud Creek was sampled at three sites. Site #1 and #2 were sampled on May 8 (spring) and August 21 (summer), 2007. Site #3 was sampled on May 9 (spring) and August 21 (summer), 2007. All three sites had water flowing in the spring and sites #1 and #3 contained flowing water during the summer surveys (Table 6). Site #2 contained interrupted standing pools of water during the summer survey (Table 6). Only fathead minnows and white suckers were observed at the lower site (Site #1) in the spring, while those two species with the addition of lake chubs and longnose dace were observed there during the summer survey (Table 2). Fathead minnows, lake chubs, and white suckers were observed at Site #2 (near the Rosebud State Park housing complex) during both the spring and summer surveys (Table 2). Site #3, the highest upstream site, produced fathead minnows, lake chubs, longnose dace, and white suckers during both spring and summer surveys (Table 2). The maximum number of fish species observed at Site #2 during MFWP prairie stream surveys since 2003 has been three (Figure 11), and longnose

dace have not been observed there in any survey. The absence of longnose dace at Site #2 may be due to the low percentage of cobble and lack of coarse gravel composition in the streambed substrate (Table 7), which are substrate types that this species appears to prefer to inhabit. Data indicates that the species composition has not changed at any of the three CBM survey sites since 2003 surveys, as is seen in Figure 11, though there is minor seasonal variation that could be due to sampling effort and methods of different survey personnel. Northern leopard frogs, a plains garter snake, and a painted turtle were observed during Rosebud Creek surveys as seen in Table 4.

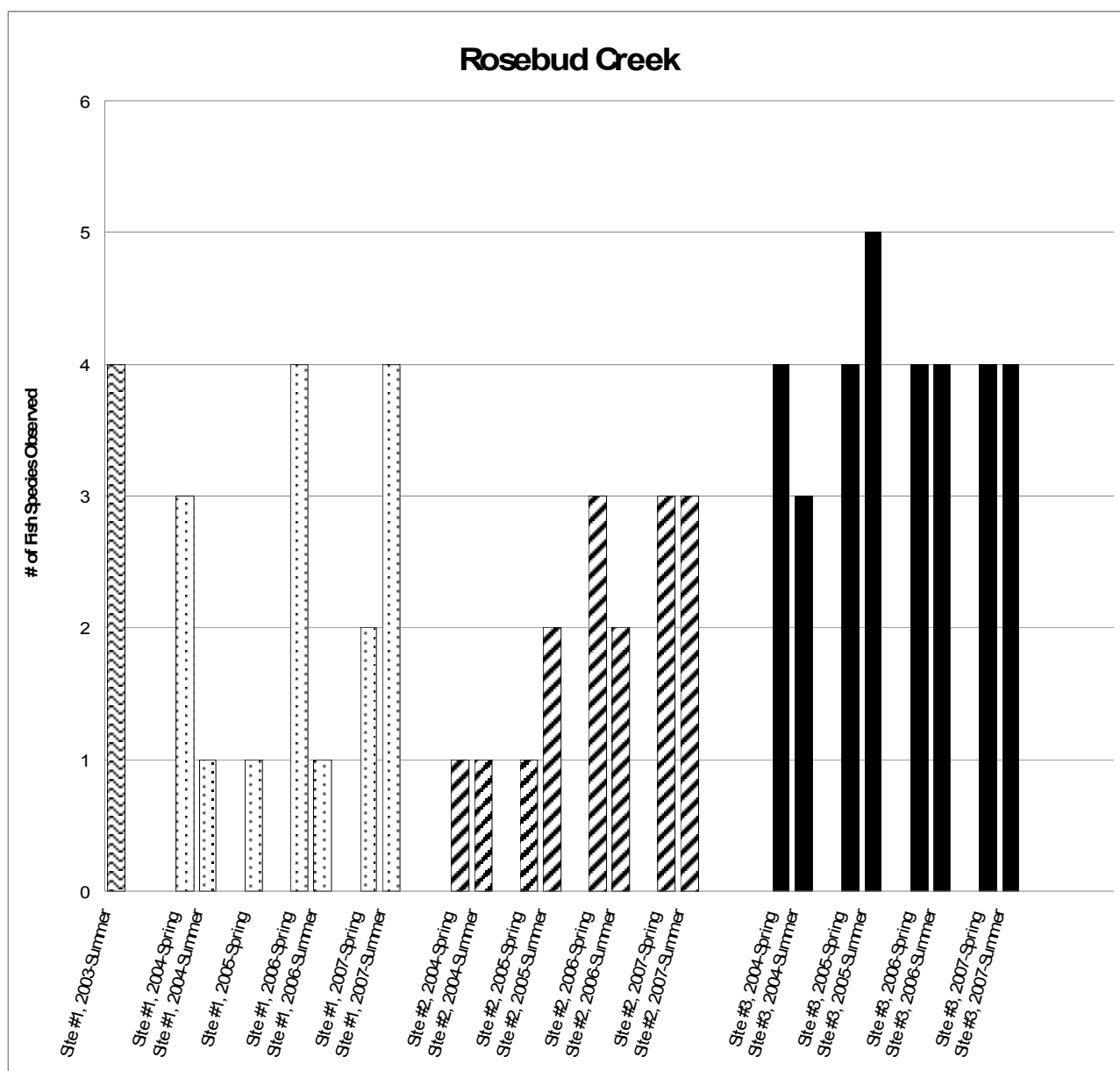


Figure 11. Number of fish species observed at three Rosebud Creek CBM repeat sites by year and season, 2003-2007.

ACKNOWLEDGEMENTS

Thanks to the numerous private landowners for access to survey sites on their properties. Sean McChesney was active in all aspects of field surveys and equipment maintenance. Allan Ankrum, Dwayne Andrews, Dennis Drieling, George Landon, Rosa McIver, and Stephanie Meggars provided additional assistance in performing field surveys. I would also like to thank the Northern Cheyenne Tribe for allowing me access to sample streams located on tribal lands and Sean Stump for assisting in those surveys.

LITERATURE CITED

- Clancey, C. and R. W. Gregory. 1976. The Aquatic Invertebrates and Fish Fauna of Sarpy Creek, Montana. Cooperative Fishery Research Unit. Montana State University. Bozeman, MT.
- DeLorme. 2001. Montana Atlas & Gazetteer. 4th Edition. Yarmouth, ME.
- Drieling, D.J. 2006. Unpublished 2006 Region 7 Prairie Stream Survey Report. Montana Fish Wildlife and Parks. Miles City, MT.
- Elser, A.E., M.W. Gorges, and L.M. Morris. 1980. Distribution of Fishes in Southeastern Montana. Montana Fish Wildlife and Parks and U.S. Department of the Interior Bureau of Land Management. Miles City, MT.
- Holton, G.D. and H.E. Johnson. 2003. A Field Guide to Montana Fishes. 3rd Edition. Montana Fish Wildlife and Parks. Helena, MT.
- McDonald, Ken. 2003. Native Prairie Fish Survey and Inventory Project Performance Report. Montana Fish Wildlife and Parks. Helena, MT.
- Reichel, J. and D. Flath. 1995. Identification of Montana's Amphibians and Reptiles. Montana Fish Wildlife and Parks. Helena, MT.
- Werner, J. K., B. A. Maxell, P. Hendricks, and D. L. Flath. 2004. Amphibians and Reptiles of Montana. Mountain Press Publishing Company. Missoula, MT.

Appendices - Prairie Stream Surveys 2007 – Region 7

Appendix A. Name and location by HUC of Region 7 prairie stream survey sites sampled, May – September 2007.

Site Name	LLID	Stream Length (miles)	Latitude	Longitude	Township	Range	Section	Land Ownership	Sampling Method
10040104 – Fort Peck Reservoir									
Big Dry Creek	1064126479793	43.23	47.45935	-106.32862	20N	42E	26	USFWS	SEINED
Snap Creek	1062686475561	11.22	47.56055	-106.29833	21N	42E	23	USFWS	ELECTROFISHED
10040106 – Little Dry									
Lone Tree Creek	1066443469962	24.80	46.90401	-106.61852	13N	40E	2	PRIVATE	SEINED
10040202 – Middle Musselshell									
Antelope Creek	1076819467657	9.05	46.7488	-107.62202	12N	33E	31	STATE	
Big Breed Creek	1076863468123	23.16	46.81254	-107.60458	12N	33E	18	PRIVATE	SEINED
Orchard Coulee	1077980466711	10.53	46.68325	-107.78817	11N	31E	26	STATE	SEINED
10040205 – Lower Musselshell									
Bair Coulee	1076445470298	5.61	47.05433	-107.61285	15N	32E	24	PRIVATE	
Dead Horse Creek	1077161472735	5.96	47.28918	-107.71986	18N	31E	26	PRIVATE	
Hensleigh Coulee	1076751470501	6.19	47.05428	-107.67518	15N	32E	21	PRIVATE	
Seventynine Coulee	1078220472915	9.67	47.34443	-107.77299	18N	31E	9	PRIVATE	
Skeleton Creek	1075830470215	6.11	47.02095	-107.57657	15N	33E	31	PRIVATE	SEINED
Tuccori Coulee	1075697470283	6.93	47.03914	-107.55527	15N	33E	29	PRIVATE	
10080015 – Lower Bighorn									
Thunder Creek	1074079460890	5.85	46.08942	-107.402940	4N	35E	17	PRIVATE	SEINED
10090101 – Upper Tongue									
Deer Creek		11.00	45.05529	-106.70296	9S	41E	10	PRIVATE	SEINED
Hanging Woman Creek	1065213453206	47.90	45.22753	-106.49899	7S	43E	17	PRIVATE	SEINED
Waddle Creek	1064482450497	10.60	45.04868	-106.44972	9S	43E	17	PRIVATE	SEINED
Youngs Creek		20.10	45.01468	-106.97492	9S	39E	29	PRIVATE	ELECTROFISHED

Appendices - Prairie Stream Surveys 2007 – Region 7

Appendix A – continued.

Site Name	LLID	Stream Length (miles)	Latitude	Longitude	Township	Range	Section	Land Ownership	Sampling Method
10090102 – Lower Tongue									
Ash Creek	1058240461243	33.03	46.08418	-105.77988	4N	48E	20	PRIVATE	SEINED/ELECTROFISHED
Bales Creek	1061777450686	5.93	45.04694	-106.146150	9S	45E	13	PRIVATE	
Billup Creek	1061239451223	5.18	45.0908	-106.146600	8S	45E	36	STATE	
Brian Creek	1061497454136	7.11	45.41223	-106.198160	5S	45E	8	USDA-FOREST	
Crazy Head Fork			45.60566	-106.515470	3S	42E	2	TRIBAL	ELECTROFISHED
Dry Creek	1063487454865	5.41	45.48518	-106.340220	4S	44E	6	PRIVATE	
East Fork Otter Creek		21.60	45.56841	-106.172760	3S	45E	21	STATE	
King Creek	1063343455097	9.64	45.46895	-106.259000	4S	44E	26	USDA-FOREST	SEINED
Little Bear Creek	1062107451853	12.76	45.18609	-106.212710	7S	45E	34	PRIVATE	
Logging Creek #1		14.70	45.58466	-106.427650	3S	43E	16	TRIBAL	ELECTROFISHED
Logging Creek #2		14.70	45.56586	-106.354040	3S	44E	19	TRIBAL	ELECTROFISHED
North Fork Taylor Creek	1061002452649	10.83	45.26872	-106.089550	6S	46E	33	USDA-FOREST	SEINED
Paget Creek	1061480453785	8.95	45.37358	-106.215940	5S	45E	30	USDA-FOREST	SEINED
Pumpkin Creek	1057527462498	171.10	46.07641	-105.5521	4N	50E	30	PRIVATE	SEINED
Taylor Creek	1061478452857	18.57	45.27087	-106.106910	6S	46E	33	USDA-FOREST	SEINED
White Horse Spring			45.5869	-106.528700	3S	42E	10	TRIBAL	SEINED
Wooden Thigh Creek #1			45.61762	-106.498360	2S	42E	36	TRIBAL	ELECTROFISHED
Wooden Thigh Creek #2			45.58996	-106.457550	3S	43E	8	TRIBAL	ELECTROFISHED

Appendices - Prairie Stream Surveys 2007 – Region 7

Appendix A – continued.

Site Name	LLID	Stream Length (miles)	Latitude	Longitude	Township	Range	Section	Land Ownership	Sampling Method
10090207 – Middle Powder									
Bloom Creek	1057530451970	8.37	45.21953	-105.805370	7S	48E	14	USDA-FOREST	
Dry Creek	1056186452759	6.46	45.28084	-105.631610	6S	50E	29	PRIVATE	
10090208 – Little Powder									
Little Powder River	1053320454662	71.60	45.10466	-105.33071	8S	52E	27	PRIVATE	SEINED/ELECTROFISHED
Scott Creek	1050958452948	13.34	45.26833	-105.038950	6S	54E	36	STATE	SEINED
10090209 – Lower Powder									
Archdale Creek	1050980464122	10.57	46.41783	-105.048330	8N	53E	25	BLM	SEINED
Cox Creek	1053072464279	9.18	46.42509	-105.298130	8N	51E	25	PRIVATE	
Long Prong Locate Creek	1050927464027	10.02	46.32344	-105.049370	7N	53E	35	STATE	
Spring Creek		28.20	45.82289	-104.85794	1N	55E	23	PRIVATE	SEINED
10090210 – Mizpah									
Ash Creek	1054985455657	5.50	45.5791	-105.54386	3S	50E	15	PRIVATE	
Big Bobcat Creek	1054132457838	8.28	45.78275	-105.420810	1S	51E	3	PRIVATE	SEINED
Dick Creek	1054191457434	11.23	45.74041	-105.427470	1S	51E	21	PRIVATE	SEINED
Hudson Creek	1054434456288	7.22	45.61209	-105.418660	3S	51E	3	PRIVATE	
Lake Creek	1054745455900	13.26	45.59424	-105.498500	3S	50E	12	PRIVATE	
Mud Spring Creek	1054291456701	10.77	45.66943	-105.436250	2S	51E	16	STATE	
10100001 – Lower Yellowstone-Sunday									
Bone Coulee	107467546042	6.10	46.40461	-107.50735	8N	34E	32	PRIVATE	
Caprock Coulee	1056980466572	5.96	46.68361	-105.769840	11N	47E	26	PRIVATE	
Cottonwood Creek	1055685466226	39.11	46.61154	-105.55896	10N	49E	21	PRIVATE	SEINED
Cox Coulee	1071365459663	5.20	45.96689	-107.143320	3N	37E	32	PRIVATE	

Appendices - Prairie Stream Surveys 2007 – Region 7

Appendix A – continued.

Site Name	LLID	Stream Length (miles)	Latitude	Longitude	Township	Range	Section	Land Ownership	Sampling Method
10100001 – Lower Yellowstone-Sunday (continued)									
Donley Creek	1068465459333	10.69	45.90087	-106.916670	2N	39E	29	PRIVATE	
Geyser Spring Coulee	1072290463992	12.35	46.51405	-107.27027	9N	35E	24	PRIVATE	
Horse Coulee	1071245459103	12.90	45.92729	-107.048390	2N	38E	18	PRIVATE	
McGraw Coulee	1067984462764	11.76	46.29428	-106.79578	6N	39E	12	PRIVATE	SEINED
Rainwater Coulee	1071331459834	5.77	45.98557	-107.136250	3N	37E	28	PRIVATE	
Sarpy Creek	1071212462951	103.20	45.85068	-107.106000	1N	37E	10	PRIVATE	SEINED
Slaughterhouse Creek	1066525462745	12.49	46.25543	-106.65189	6N	41E	19	PRIVATE	
West Muggins Creek	1075149464679	15.21	46.48088	-107.54507	8N	33E	1	PRIVATE	
10100002 – Big Porcupine									
East Blacktail Creek	1071068465982	23.37	46.63569	-107.04773	10N	37E	10	PRIVATE	SEINED
Living Ash Creek	1069245464314	10.58	46.44082	-106.90626	8N	38E	13	PRIVATE	
Sun Coulee	1071030465384	12.68	46.53613	-107.23611	9N	36E	18	PRIVATE	
10100003 - Rosebud									
Alderson Creek	1066684456235	7.65	45.63447	-106.57622	2S	42E	29	TRIBAL	ELECTROFISHED
East Fork Muddy Creek			45.51508	-106.71206	4S	41E	6	TRIBAL	ELECTROFISHED
Lame Deer Creek	1067048456728	16.33	45.63649	-106.67487	2S	41E	28	TRIBAL	ELECTROFISHED
Muddy Creek		11.90	45.59084	-106.747090	3S	40E	12	TRIBAL	ELECTROFISHED
Rosebud Creek site #1	1064765462744	207.60	45.2201	-106.95171	7S	39E	21	PRIVATE	ELECTROFISHED
Rosebud Creek site #2	1064765462744	207.60	45.21564	-106.97564	7S	39E	20	STATE	ELECTROFISHED
Rosebud Creek site #3	1064765462744	207.60	45.21363	-107.001930	7S	39E	19	PRIVATE	ELECTROFISHED

Appendices - Prairie Stream Surveys 2007 – Region 7

Appendix A – continued.

Site Name	LLID	Stream Length (miles)	Latitude	Longitude	Township	Range	Section	Land Ownership	Sampling Method
10100004 – Lower Yellowstone									
Cigar Creek	1051693471102	5.96	47.17017	-105.217490	16N	51E	2	PRIVATE	
Coal Creek	1052104468150	14.13	46.854	-105.24625	13N	51E	27	BLM	SEINED
Crane Creek	1042403475717	22.19	47.58839	-104.29333	21N	58E	8	PRIVATE	
Hay Creek	1052012472283	12.95	47.25856	-105.2529	17N	51E	5	PRIVATE	
Hodges Creek	1045074470130	20.53	46.9851	-104.390560	14N	58E	8	PRIVATE	
O'Brien Creek	1041891476044	13.20	47.6036	-104.14183	21N	55E	1	PRIVATE	SEINED
Plenty Creek	1055324468929	15.35	46.89738	-105.533650	13N	49E	9	BLM	SEINED
Robertson Creek	1057492469372	6.27	46.90384	-105.820950	13N	47E	6	PRIVATE	
Stouts Creek	1054569469324	5.78	46.94043	-105.484410	14N	49E	26	BLM	
War Dance Creek	1044569473393	10.13	47.32249	-104.47491	18N	57E	17	PRIVATE	
Whoopup Creek	1047858470112	13.60	47.0354	-104.921840	15N	54E	19	PRIVATE	
10100005 – O'Fallon									
Alkali Creek	1047269460987	6.00	46.09576	-104.727460	4N	56E	14	PRIVATE	SEINED
Dry Creek	1049285465155	5.44	46.49627	-104.93019	9N	54E	33	PRIVATE	
Lone Tree Creek	1046932460681	5.21	46.02925	-104.727337	3N	56E	14	PRIVATE	
10110201 – Upper Little Missouri									
Blacktail Creek	1042189452451	17.33	45.274	-104.27348	6S	61E	29	PRIVATE	SEINED
Flasted Draw	1045101459726	9.58	45.96014	-104.506430	2N	58E	3	PRIVATE	
Hackberry Creek	1040666454249	17.21	45.42046	-104.081000	5S	62E	9	PRIVATE	ELECTROFISHED
North Thompson Creek	1047792449648	45.01	45.06421	-104.89375	9S	56E	8	PRIVATE	SEINED
Sand Creek	1040543454529	11.44	45.47804	-104.124470	4S	62E	19	PRIVATE	SEINED

Appendices - Prairie Stream Surveys 2007 – Region 7

Appendix A – continued.

Site Name	LLID	Stream Length (miles)	Latitude	Longitude	Township	Range	Section	Land Ownership	Sampling Method
10110202 - Boxelder									
Big Ramme Creek	1043612456967	14.10	45.70463	-104.37474	1S	59E	36	STATE	SEINED
Coal Creek	1041614458428	20.22	45.86597	-104.218	1N	60E	1	PRIVATE	SEINED
Corral Creek		24.80	45.48727	-104.55918	4S	58E	16	STATE	SEINED
Corral Creek	1042630458127	9.61	45.82413	-104.26534	1N	60E	21	PRIVATE	SEINED/ELECTROFISHED
Fresh Water Draw	1045272457130	6.54	45.76199	-104.53648	1S	58E	15	PRIVATE	
Lone Tree Creek	1044415456814	12.20	45.68506	-104.46552	2S	59E	5	PRIVATE	SEINED
McCarty Creek	1044268455201	13.03	45.52195	-104.43688	4S	59E	4	BLM	SEINED
West Fork Boxelder Creek	1048923452553	7.98	45.24688	-104.916520	7S	55E	12	PRIVATE	
Whitetail Creek	1046077453981	6.84	45.40179	-104.61817	5S	57E	13	PRIVATE	SEINED/ELECTROFISHED
10110204 - Beaver									
Yates Creek	1041842469877	9.57	46.96806	-104.131390	14N	60E	16	STATE	SEINED

Appendix B. Procedures used to determine Eastern Montana prairie stream survey sites.

Goal: Select 160 eastern Montana streams by HUC that have not been sampled before and fall within the Northern Plains area ecoregion.

Data Layers used:

- Bailey's Ecoregions layer-Great Plains polygon, too gross a scale for analysis
- Climax vegetation layer-from Natural resources Information System (NRIS), represents the same Great Plains Prairie area as Bailey's but at a finer scale.
- 100,000K stream routes-MFWP-built on the National Hydrography from the named streams
- 4th code HUCs- from Natural resources Information System (NRIS)
- Montana Rivers Information System (MRIS) database-for determining sampled streams

Steps:

1. Intersected the Prairie area (climax veg layer) with the 4th code HUCs to find HUCs that fell within the prairie. Dropped those HUCs that are less than 50% Prairie.
2. Determined the number of streams to sample in each HUC by dividing the amount of prairie in each HUC by the total amount of Prairie in Eastern Montana and then multiplying by 160(the total number of streams to be sampled).
3. Generated a list of streams that are sampled within the HUC's in step 1.
4. Intersected the remainder of streams (the unsurveyed with the Prairie Area) to remove streams that were in a HUC but not in an area of Prairie.
5. Sorted these unsurveyed streams by HUC and descending by length.
6. Selected the number of streams to sample for each HUC (from step2) starting with the longest streams. The alternatives were selected by taking the next consecutive streams in the list (approximately twice the number of sample streams). Length was chosen as the criteria as the perennial-intermittent stream category was not useable.
7. A random river mile was derived from each selected stream. A Lat-long was determined for each point and whether that point fell within public land.

The Numbers:

52 HUC's determined to fall within the Prairie ecoregion.

4207 unsurveyed streams in these 52 HUC's.

367 streams surveyed in these 52 HUC's

1-9 streams selected to sample in each HUC.

160 samples, 264 alternates, total of 424 streams selected

84% if the streams have some public access along them

21% of the selected sample points fall in public land

Appendix C. Fish and habitat sampling protocol and gear list for prairie stream surveys in Region 7, May – September 2007.

1. **Site location.**-Locate the sampling site using GPS for random sites, or by convenience for non-random sites. The GPS location will be the center of the reach, this is where you place the “F” flag (see Step 2). If the site is dry, shift the reach up or downstream to capture the most wetted channel possible on the parcel of land where you have permission for sampling.
2. **Laying out the sample reach.**-Lay out a 300 m sample reach using a measuring tape and a set of 11 pin flags (labeled A-K). Follow the curves in the stream channel with the measuring tape; do not cut across curves. To avoid spooking fish, walk along the bank, not in the stream. Place a flag every 30 m. The “A” flag will be at the downstream end; the “K” flag will be at the upstream end of the reach. The “F” flag will go in the center of the reach.
3. **Block nets.**-Place block nets (these can be old seines, 1/4” mesh) at the upstream (K flag) and downstream (A flag) ends of the sample reach if the water in the channel is continuous, deeper than 25 cm, and relatively clear. This prevents fish from leaving the sample reach.
4. **Seining.**-Select the seine based on the size of the stream to be sampled. The seine length to be used should be approximately equal to or slightly greater than the stream width, and the seine height should be about 1.5 to 2 times greater than the depth of the stream. Dip nets can be used in very shallow, small habitats. Seining begins at the upstream end (K flag) and proceeds downstream to the A flag. Two people perform seining, one on each end of the seine. In pools, the seine is pulled down the stream channel, using the shore and other natural habitat features as barriers. Begin with the seine rolled up on each seine brail. The seine is typically set perpendicular to shore and hauled downstream parallel to shore. As you proceed, let out enough seine so that the seine forms a “U” shape, but not so much that the net is hard to control. Adjust the length of the seine by rolling or un-rolling net on the seine brail. The speed of seining should be fast enough to maintain the “U” shape, but not so fast that the floats become submerged, or that the seine’s lead line come way up off the bottom of the stream. If rocks or other snags are on the bottom, the seine can be lifted off the bottom for a moment to avoid the snag, or one of the netters can bring the seine around the snag to avoid it, all the while maintaining the forward progress of the seine. Similarly, areas of dense aquatic vegetation can be avoided. It is important not to stop the forward progress, because fish will swim out of the seine. It is better to avoid a snag while keeping moving than to become snagged, which will allow fish to escape. In “snaggy” waters, keep more of your seine rolled up for better control.

Proceed downstream while seining. In narrow streams, the entire channel width is spanned with the seine. In wider streams, one person walks along the shore, while the other wades through the channel. The length of each seine haul will depend on the natural features of the stream channel and shoreline, but seine hauls should not normally be more than 60 or 90 m long. Side channel bars or the end of a

Appendices - Prairie Stream Surveys 2007 – Region 7

standing pool are good areas to haul out or “beach” the seine. Where a large bar or end of a standing pool is present both netters can simply run the net up on the shore. In streams with steep banks or lack of obvious seine beaching areas the “snap” technique can be used. At the end of the haul, the person near shore stops, while the person farthest out turns into shore, quickly, until the seine is up against the bank. The two netters then walk away from each other, taking the slack out of the seine, and keeping the seine’s lead line up against the bank.

In riffles, with moderate to fast current, the “kick seine” technique can be used. The seine is held stationary in a “U” shape, while the other team member disturbs the substrate immediately upstream of the net. Then the net is quickly “snapped” out of the water by both team members using an upstream scooping motion.

Seine the entire 300 m reach, covering the linear distance at least once. If part of the 300 m is dry, just skip it. If the stream is much wider than your seine, do extra seine hauls in the large pools to cover the extra width. Sample all habitat types (shoreline, thalweg, side channels, backwaters).

After each seine haul, place fish in a bucket. If the water is warm, or you have captured many fish, place fish in a fish bag to keep them alive until seining is completed. If you have to work up fish before seining is completed, release processed fish in an area that has already been seined, as far away from the area remaining to be seined as possible (or outside of the block nets). Large fish such as northern pike, common carp, white sucker, shorthead redhorse, or channel catfish, can be measured, given a small clip to the lower caudal fin and released immediately.

5. ***Processing captured fish.***-Record the species of each fish captured, and measure 20 “randomly” selected fish to the nearest millimeter, total length. If the species of fish is unknown, try to at least record it as Unknown type 1, Unknown type 2, etc. Keep track of and record the minimum and maximum length of each species.

For each species, preserve a subsample of at least 10 individuals per site to serve as voucher specimens. Record a small letter “v” next to the recorded length of the fish that is vouchered to allow for later validation. For *Hybognathus* spp., voucher up to 20 individuals per site. Kill the fish to be vouchered by placing them in a small bucket or 1000 ml nalgene jar with an overdose solution of MS-222. After fish processing is completed, drain the MS-222 solution and place the fish in a 1000 ml nalgene jar with a 10% solution of formalin (in clear water, if possible). For specimens longer than 150 mm, an incision should be made on the right ventral side of the abdomen after death, to allow fixative to enter the body cavity. The volume of formalin solution should be approximately equal to the twice the volume of fish tissue to be preserved, and the fish volume should be considered water

Appendices - Prairie Stream Surveys 2007 – Region 7

when concentrations are determined. For example, if the fish take up 250 ml of the 1000 ml volume, you need about 500 ml of 10 % formalin solution (75 ml formalin and 425 ml water) in the 1000 ml nalgene jar. If necessary, use a second jar to accommodate all of the specimens. Use safety glasses and gloves when pouring formalin. Do not let the fish “cook” in the sun for a while and preserve them later, do it as soon as possible. Label all jars inside and out with Site, Site Number, Lat/Long, Date, Collectors names. Use pencil on Write-In-the-Rain or high rag paper for inside labels (just put the label right in with the fish), use a sticker label on the outside, cover it with clear (ScotchPad high performance packing tape pad 3750-P). Fish specimens should be left in formalin solution for at least 2-7 days. Fish specimens must have formalin solution soaked out before being handled extensively. Specimens should be soaked in water for at least 2 days, and water should be changed at least four times during this period. After soaking out the formalin, the fish specimens should be placed in either 70% ethanol or 40% isopropanol for long-term storage.

6. **Habitat survey.**-Channel width, depth of water, and substrate will be measured at 11 transects perpendicular to the stream channel (located at Flags A-K), and along the thalweg in 10 thalweg intervals between transects (deepest part of channel). Stream width is measured to the nearest 0.1 m, depth is measured to the nearest cm, and substrate sizes and codes are on the data sheet. One person will be in the stream taking measurements while the other records data. Record the Latitude and Longitude (in digital degrees) of the F flag, the stream name, site number, the date, the flow status (flowing, continuous standing water, or interrupted standing water) and the names of the crew members on the data sheet. Take photographs of the site, capturing as much of the sampling reach as possible. Make sure the date feature on the camera is turned on, to allow for later identification of site photographs.

Transects.-Start on the left bank (facing downstream) at Flag A. Measure and record the wetted width of the channel to the nearest 0.1 m. Measure and record (separated by a comma on the data sheet) five equally spaced depth and substrate measurements across the wetted stream channel:

1. Left Bank-5 cm from the left bank;
2. Left Center-halfway between the Center and the Left Bank;
3. Center-center of the wetted stream;
4. Right Center-halfway between the Center and the Right Bank;
5. Right Bank-5 cm from the right bank

Thalweg.-Begin by recording the depth and substrate 3 m upstream of the transect, in the deepest part of the channel (thalweg). Proceed up the thalweg to Flag B, recording depth and substrate every 3 m along the thalweg. You will record a total of 10 depths and substrates between each pair of transects. If the stream channel is dry, record a 0 for depth, and record the substrate. The last thalweg measurement point should fall on the next upstream transect. The 3 m interval can be

Appendices - Prairie Stream Surveys 2007 – Region 7

estimated, and it is helpful if the data recorder helps to keep the person in the stream from “squeezing” or “stretching” the thalweg measurements.

Repeat this procedure until all 11 transects and 10 thalweg intervals are completed.

Gear List

- 20', x 6' x 1/4" heavy delta seines
- 15' x 4' x 1/4" heavy delta
- 30' x 6' x 1/4" heavy delta (or delta) with 6' x 6' x 6' bag
- Fish bags: nylon diver's bags, 1/4" mesh 18" x 30"
- Mudders – 109.00 at Ben Meadows
- Block nets, Tent stakes
- Stream Conductivity meter
- Thermometer
- Turbidity meter (LaMotte, Ben Meadows 224805, \$795.00-might try the “transparency tube” Ben Meadows 224196, \$52.95)
- Waders (breathable waders are essential for this work-Cabelas has them for about \$100/pair), hip boots are usually too low
- Lug sole wading boots (Cabelas)
- Habitat pole (I make habitat poles out of 1.0" OD PVC pipe. 1.5 m long including caps. Score the pipe every 10 cm with a pipe cutter, then use a Sharpie to mark rings around the pole at the scores, and label the pole 10, 20, 30, etc. 5 cm marks are made between the 10 cm rings, you can visually estimate between the 5 cm marks to get to the nearest cm. Spray or brush a Urethane finish on the pole or your marks will come off fast with sunscreen and bug dope.)
- Metric 30 m tape (Ace Hardware actually carries a tape with metric on one side)
- Measuring boards, one short 300 mm (half a 6" PVC works well for Hybognathus “fin flotation”, one long, ~0.5-1 m, you can just use a meter stick for the odd big fish)
- Hand lens
- Small 1 gallon red bucket from Ace for doping fish
- 5 gallon buckets
- MS-222
- Labels and tape pads for fish samples
- 1000 ml Nalgene jars
- Formalin (buffered is great, but more expensive-I throw a Roloids in each jar of fish to neutralize the acidity)
- Clip board
- 11 Pin flags labeled A-F

Appendices - Prairie Stream Surveys 2007 – Region 7

Appendix D. Fish data entry form used during Region 7 prairie stream surveys, 2007.

Site: _____ Date: _____ Water Flowing: _____
HUC: _____ Continuous Standing Water: _____
Interrupted Standing Pools: _____

Latitude: _____ Observers: _____
Longitude: _____

Species	Total Length (mm)
	Total Count
	Total Count
	Total Count
	Total Count
	Total Count
	Total Count
	Total Count

Temperature: _____ Dissolved
pH: _____ Oxygen: _____
Conductivity: _____ Salinity: _____
Turbidity: _____ Page ____ of ____
Additional Comments:

Appendices - Prairie Stream Surveys 2007 – Region 7

Appendix E. Habitat data entry form used during Region 7 prairie stream surveys, 2007.

Site: _____

Date: _____

Water Flowing: _____

HUC: _____

Continuous Standing Water: _____

Observers: _____

Interrupted Standing Pools: _____

Latitude: _____

Dry: _____

Longitude: _____

Transect Profile

Transect	Width (XX.X m)	Left Bank depth, sub	Left Center depth, sub	Center depth, sub	Right Center depth, sub	Right Bank depth, sub
A						
B						
C						
D						
E						
F						
G						
H						
I						
J						
K						

BR = Bedrock (> 4000 mm) (larger than a car)
 BL = Boulder (250 to 4000 mm) (basketball to car)
 CB = Cobble (64 to 254 mm) (tennis ball to basketball)
 CG = Coarse Gravel (16 to 64 mm) (marble to tennis ball)
 FG = Fine Gravel (2 to 16 mm) (ladybug to marble)
 SA = Sand (0.06 to 2 mm) (gritty - up to ladybug size)
 FN = Silt/Clay/Muck (not gritty)
 HP = Hardpan (FIRM, CONSOLIDATED, Fine Substrate)
 WD = Wood (any size)
 OT = Other (describe in comments)

Thalweg Profile

Station	A - B depth, sub	B - C depth, sub	C - D depth, sub	D - E depth, sub	E - F depth, sub	F - G depth, sub	G - H depth, sub	H - I depth, sub	I - J depth, sub	J - K depth, sub
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										

Temperature: _____ Dissolved Oxygen: _____

pH: _____ Salinity: _____

Conductivity: _____

Turbidity: _____

Comments & Observations:

